The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Vol. XXIV, No. 22 CHICAGO October 22, 1921

EDITORIAL DEPARTMENT—

Nathan C. Rockwood, Editor
Chas. A. Breskin, Associate Editor

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A. S. Barnett,
Western Representative

SUBSCRIPTION—Two dollars a year to U. S. and Possessions. Three dollars a year to Canada and foreign countries. Twenty-five cents for single copies.

TO SUBSCRIBERS—Date on wrappers indicates issue with which your subscription expires. In writing to have address changed, give old as well as new address.

POST-OFFICE ENTRY—Entered as second-class matter, July 2, 1907, at the Chicago, Ill., Post-office, under the Act of March 3, 1879.

ROCK PRODUCTS—

Geo. P. Miller, Manager
E. M. Gibson, Assistant Manager

Published every other Saturday by

TRADEPRESS PUBLISHING CORP.
542 South Dearborn Street, Chicago, Ill.

W. D. Callender, President.
N. C. Rockwood, Vice-President.
Geo. P. Miller, Treasurer.
C. O. Nelson, Secretary.

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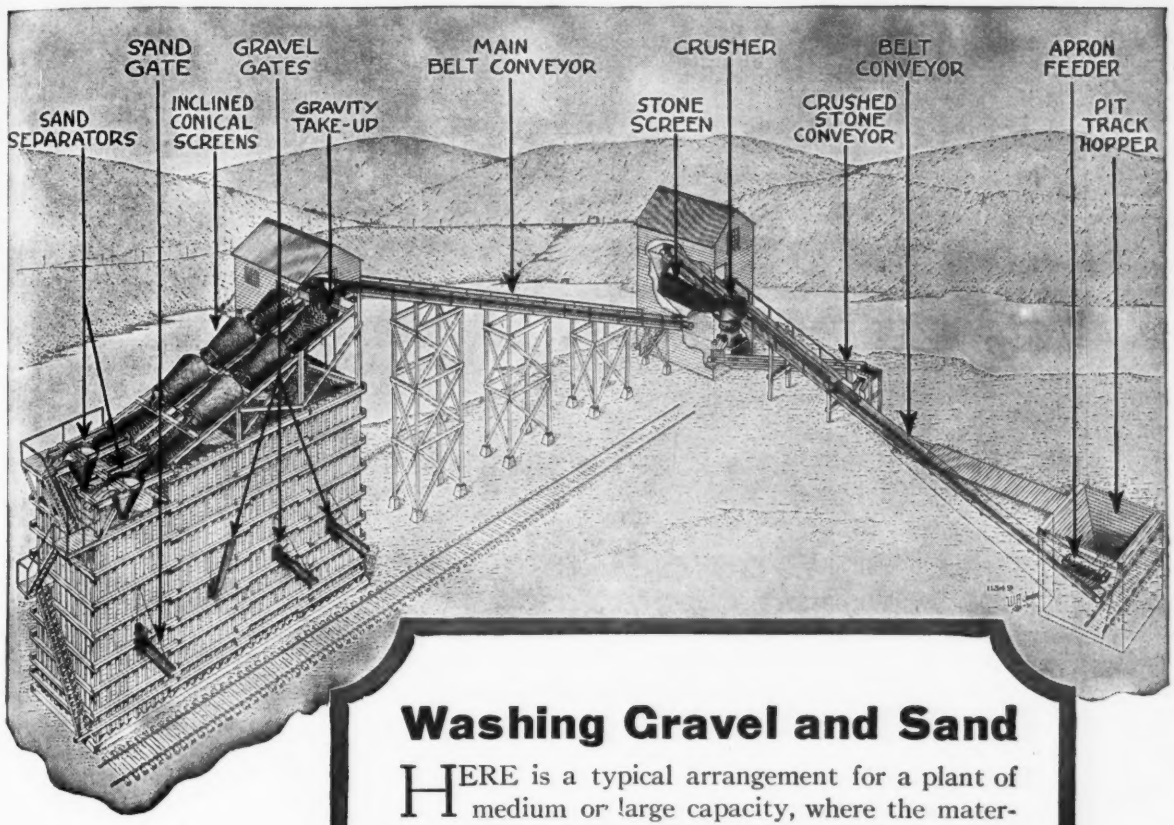

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VOL. I October 22, 1921 Number 4

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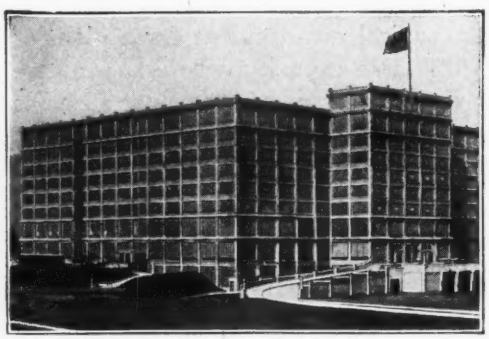

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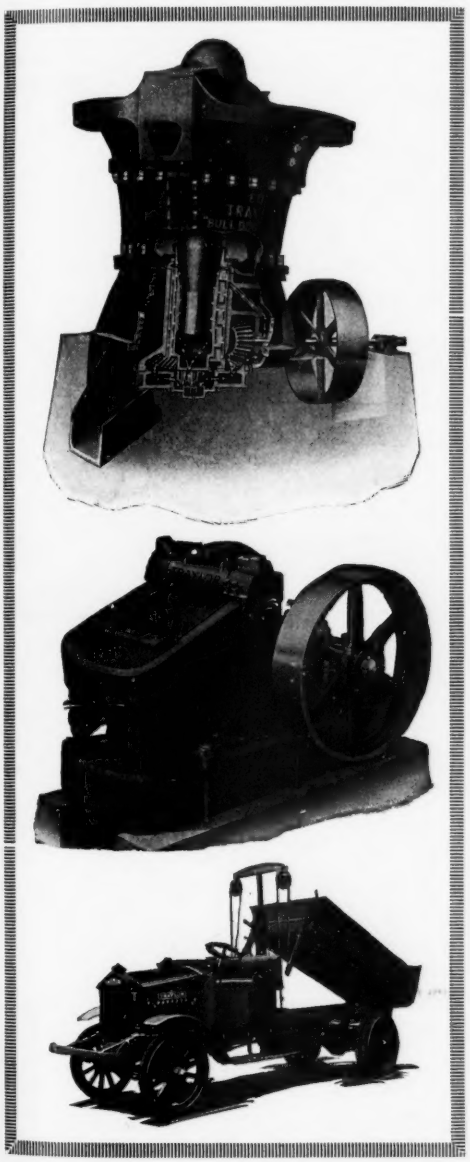

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Rock Products

Vol. XXIV Chicago, October 22, 1921 No. 22

Reconstruction of Kilns at Cedar Hollow Lime Plant

A Unique Combination of the Various Methods of Kiln Construction, from Which a High Percentage of Efficiency Is Expected

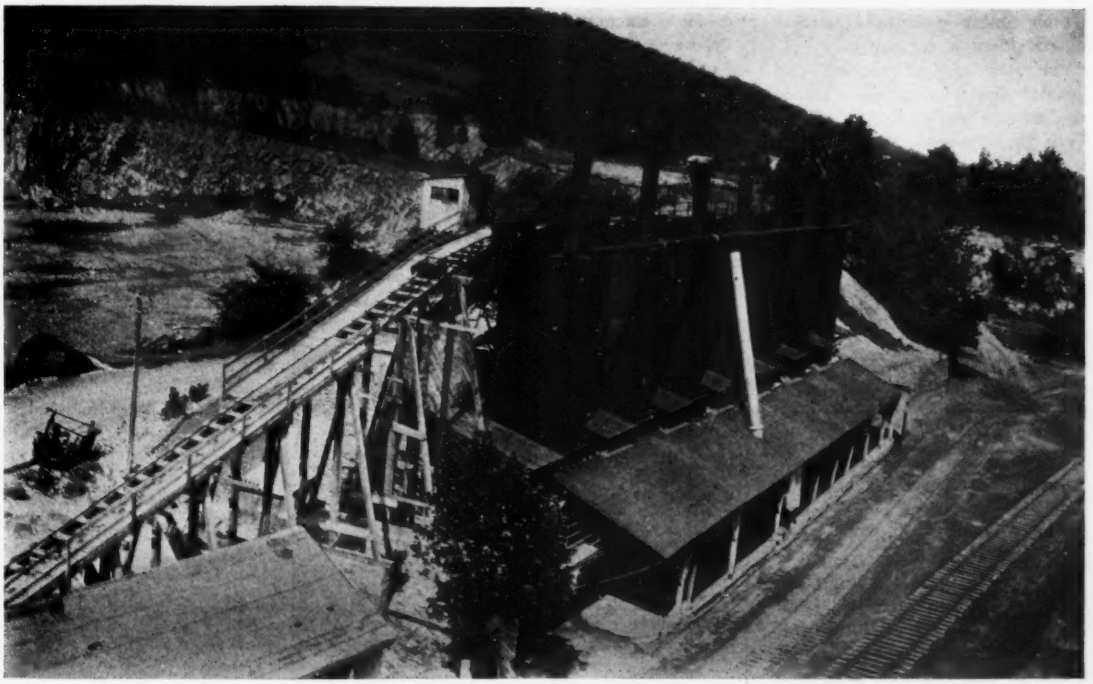
By J. G. Wilson
Engineer, Charles Warner Company, Wilmington, Del.

THE CHARLES WARNER CO., of Wilmington, Del., has rebuilt a battery of seven kilns at their Cedar Hollow plant, Devault, Pa., the entire field construction being done by the company's regular mechanical force, with the exception of the steel shells, which were contracted by an outside party.

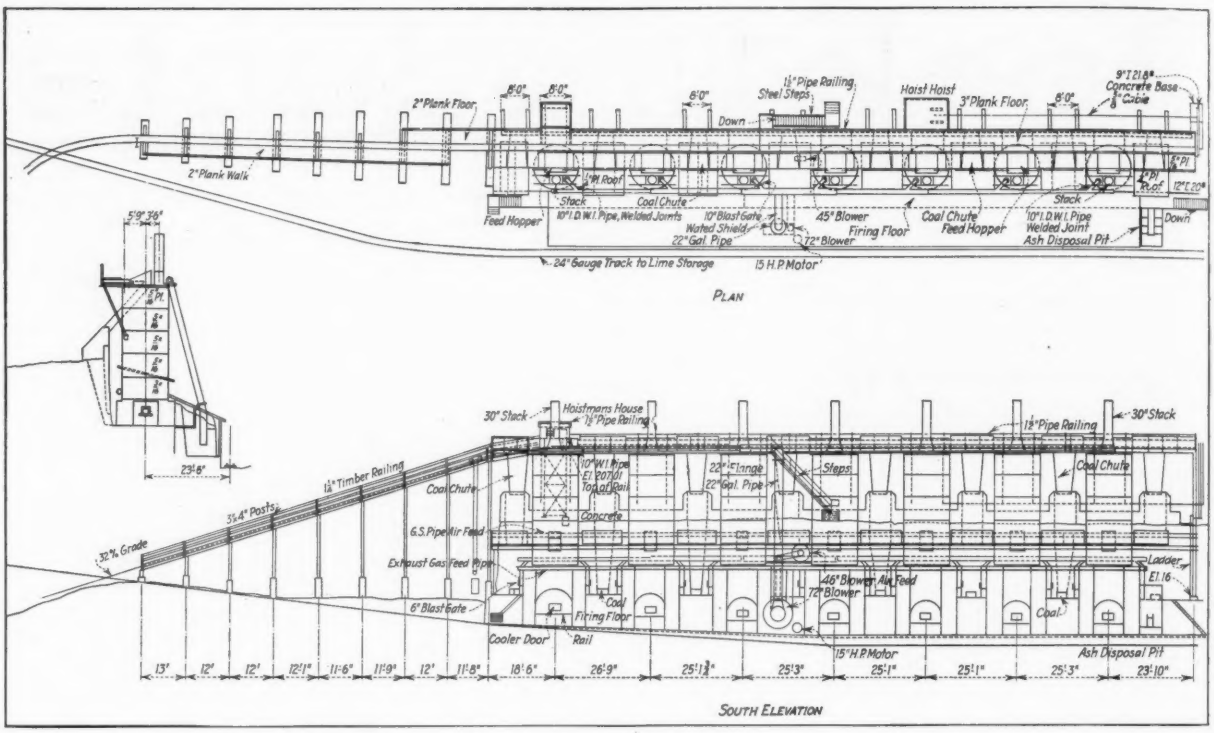
Historical Features

During the preliminary study of the seven old stone kilns for the purpose of collecting field data, many interesting historical features were revealed. It was found that the retaining wall (see cross sectional elevation) running along back of the kilns was once the face of a row of old-fashioned pot kilns, and that when the plant was given a general renovation and some improvements about two generations ago, the new "patent" kilns were erected adjacent to this wall so that stone could be hauled up in carts and dumped into the kilns, as had been done previously. As a still further proof of the presence of the pot kilns, when excavations were being made for the foundations of the coal hoppers, which run down behind the old retaining wall, one of the original old linings of "Chickie's" quartzite (siliceous sandstone) was uncovered. Incidentally, quartzite was used exclusively in the lining of the kilns before being superseded by refractory brick within the past ten years.

As good engineering practice has been applied to the lime industry only at a very recent date, it is natural that these kilns, being approximately 50 years old, had been very crudely located. Since it was decided to rebuild on the seven foundations of the more recent "patent" kilns,



Bird's-eye view of the complete reconstructed battery. The vertical section of sheet metal piping extending through the shed roof opposite kilns Nos. 3 and 4 connects the gas exhauster at ground level, to the wrought iron trunk line running along the top of the battery



General layout of seven small kilns

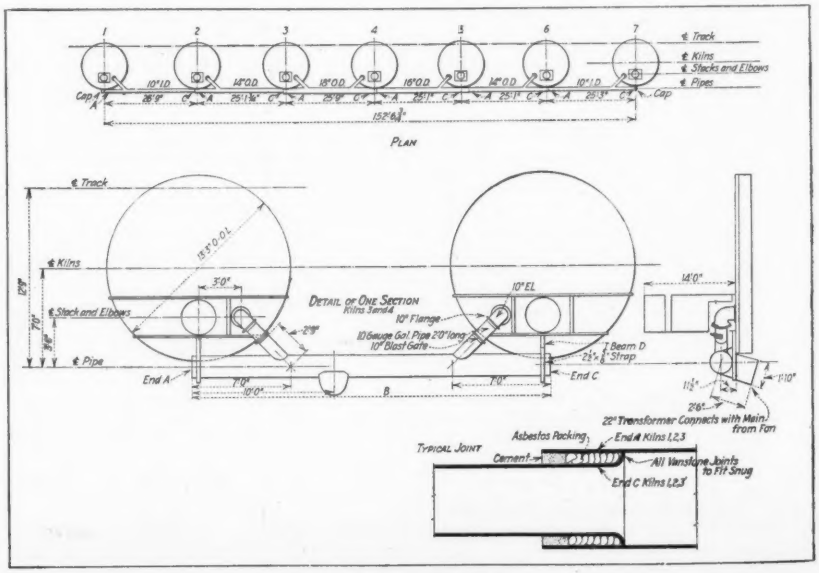
retaining their square stone bases at furnace level, considerable difficulty was experienced in obtaining a common and straight center line. Also, the furnace and firing floors were at various elevations. Even the distances between centers were such a variable that it is altogether probable that no measurements were taken at the time of the original construction—simply a dig with the heel by the hardy old plant superintendent at that time, as he paced off the distances, was the indication of the spot where each kiln was to be built.

Perhaps there had been an attempt to build these kilns in line, but the expansion and contraction during their many years of operation had caused them to move. From a very careful study of the situation, it became apparent that this motion had been aggravated by the presence of the old retaining wall. The space between the wall and kilns presented a splendid opportunity for a wedging action. Stone and rubbish had fallen from the top of the kilns and the retaining wall into the crevice, and the slight motion of the kilns, due to heat changes, permitted this tramp material to wedge down farther and farther. Result—a 45 deg. crack running from a high point in the back to a lower point in the front, continuing in some cases down below the firing floor level to the coolers. In the more recent years of the life of the kilns, it became necessary to erect heavy buttresses in the front to resist this stress.

Problems Encountered

It cannot be considered good engineering practice to build a steel shell upon a square furnace base of brick or masonry, since heat changes at this lower point will ultimately cause movement of the shell above, with consequent distortion of the tramway and other superstructures joining the tops of the kilns. A kiln should carry its steel shell down to a proper foundation, where it is not subject to heat stresses. However, in the interest of economy and owing to the fact that this particular battery of kilns is expected to be obsolete within the next 15 years, it was decided that the old square bases should be retained at furnace level if possible.

The question then arose as to whether it would be altogether safe to build the new kilns on the old rectangular bases, beginning at a convenient point above furnace level. Although the new steel shells were to be 4 ft. higher than the



Piping for small kilns

old stone kilns, their total weight would be less, as compared with the weight of the old kilns, each being of solid masonry construction 14 ft. square. Careful examination of the old "patent" kilns proved so conclusively that the trouble was due to the wedging action against the retaining wall, that it was considered entirely safe to erect on the bases provided there was no further recurrence of the wedging action. Accordingly, considerable precautions were taken. The cylindrical steel shells in themselves offer less wedging surface than the old stone kilns. In addition, the retaining wall was capped with a parapet to prevent loose material from falling off the level ground behind it, and the tramways and platforms were plated to prevent any showering of coal or stone from off the top of the kilns. Finally, the space between the retaining wall and the stone bases was cleaned out so that no wedging action would be possible in the future.

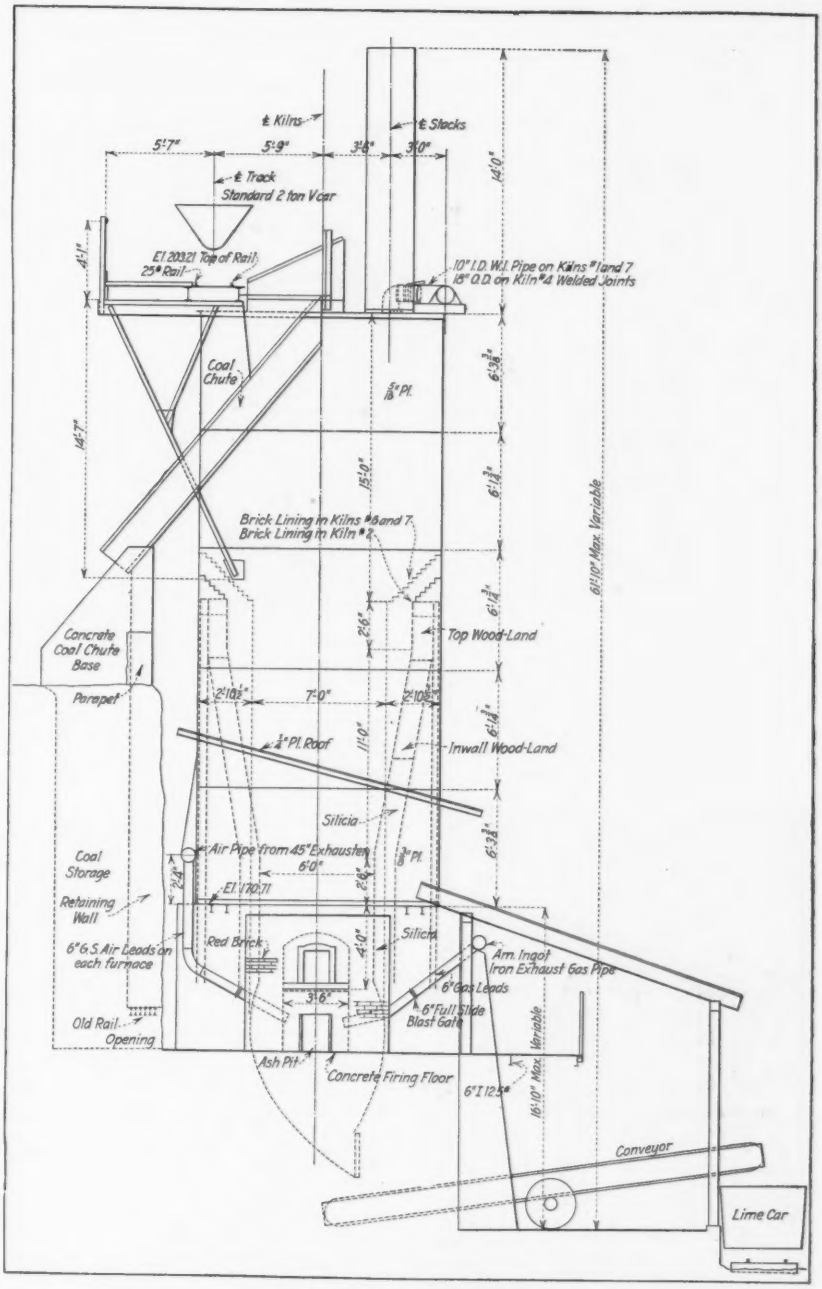
After completion of these preliminaries, the old "patent" kilns were torn down to an approximate height of 4 ft. above grate bar level, thus obtaining a common elevation on all seven foundations. Then, to insure a sound footing for the shells, four 60-pound rails were built in, with the masonry capping of the bases with flanges upward, the rails being held together with iron straps, thus forming a mat over the top of the foundations. Upon this mat the erection of the shells 12 ft. 9 in. in diameter and 31 ft. high was begun.

Steel Shells

The shells consist of five rings, the bottom one being of ⅜ in. steel plate with its vertical seams double lap riveted. The remaining four are 1/16 in. less in thickness and have a single seam of rivets. This extra strength was added in the base ring to overcome any possibility of the shells' splitting vertically from heat stresses and naturally to take the total load. Previous practice has shown that the first part of the shell to be eaten away by the kiln gases is the top. Accordingly, a ⅜ in. plate was used at this point, with bolt connection to facilitate easy removal when the time arrives for the top to be renewed.

Tramway Support

The means of support for the tramway and platforms over the top of the previous kilns consisted of legs resting on the retaining wall with a horizontal member extending over to the top of the kilns. This arrangement had long before proven itself unsuitable, because the settling during the life of the kilns had been in one or two cases as much as a foot. As a result, the tramway supporting the track over the top instead of resting on the kilns had in three places swung loose and the two adjacent kilns



West elevation of small kilns

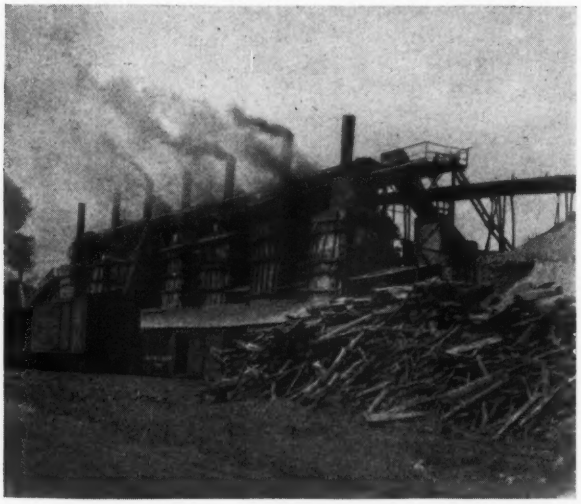
and the columns on the retaining wall were taking the load. With these conditions prevailing, it became necessary from time to time to realign the track in order to maintain its relative position with the kiln charging opening.

To overcome any similar conditions arising on the new kilns, the supporting of the tramway was accomplished by brackets built up of angles, the brace members resting on the side of the kilns and the horizontal members over the top of the kilns. This bracket arrangement, besides accomplishing uniform construction, had a fabrication and erection cost probably 40 per cent less than the preceding method.

Square pockets running down behind the retaining wall had been the means of supplying the kilns with fuel, the coal being accessible to the firemen through an opening at the base of the pit at firing floor level. Later a concrete hopper had been built about the top of these coal pits to increase their capacity and to support the lower end of a steel chute which was hung on the tramway structure above. The common elevation of the track on the top of the new kilns being approximately 4 ft. higher than

that of the former kilns, it was therefore necessary either to increase the length and the slope of the steel chutes, in order to meet their original footing or to build-up with masonry the remaining distance. The latter method was given preference, due to its cheaper cost.

A plate roof supported by channels running tangentially along the front and back of the kiln shells over the operating floor below affords protection against stone bombardment from an adjacent quarry, or anything from off the top of the kilns. As all the furnaces are on the common center line of the kilns and the retaining wall closes in another side of the working space, it was deemed advisable to provide adequate ventilation to take off the heat and furnace gases. Accordingly, the plate roof was placed considerably above the firing floor and the open space between the cylindrical kiln shell and the outboard edges of the structure were left uncovered. Thus ample air passage was obtained, which should improve working conditions for the fireman. To allow for any creeping of the kilns about their foundations, the main supporting channels have slotted holes in one end.



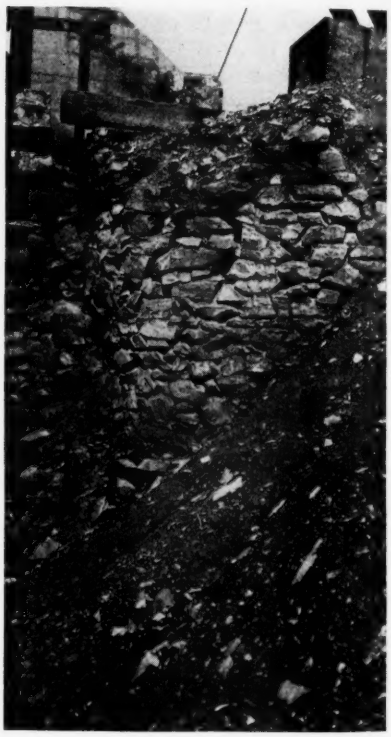
The original battery six months before the beginning of their reconstruction. As a result of the shifting and settling of these old shafts of masonry, the steel tops were continually changing their position, with consequent distortion of the track and all other superstructures. With these conditions prevailing, together with a multitude of lesser deficiencies resulting in a high maintenance cost, the complete rebuilding of the entire battery was justified

This space between the retaining wall and square stone bases of the old kilns had filled with debris from off the top of the wall and the kilns. Each subsequent move of the kilns from expansion and contraction permitted this rubbish to wedge down tightly, with a consequent fracture of the stone founlations

The next step in the reconstruction was to increase the grade of the wooden tramway which has served the previous kilns. This was accomplished by jacking up the entire structure to meet certain established elevations. After shifting the tramway until its center line intersected with the common center line of the kilns at a calculated point off No. 1 kiln, the previous old stone footings were raised with masonry to the proper height to suit the new position of the tramway. To avoid a single big break in the grade at the head of the incline, where the track changes to the horizontal, two smaller breaks were placed in the tramway.

Hoist House and Remote Control

The hoistman's house was erected off No. 1 kiln at such a point so that the operator could plainly see the cars at the foot of the incline. Stone and coal are hoisted to the top of the kilns in standard Cedar Hollow, two-ton V-type body cars, two cars constituting a haul. The coal is dumped into the above-mentioned coal chutes and slides into the concrete storage hoppers below. The stone is dumped into the kilns through hoppers having hinged doors balanced for easy manipulation.



A close-up of the quartzite (highly silicious sandstone) lining of an old Cedar Hollow pot kiln, uncovered east of No. 7. A whole row of similar kilns were operated years ago directly back of the heavy retaining wall, shown in the left of the picture

If the hoistman desires to place one carload of coal or stone at any two respective kilns, he simply throws his main switch at the lever house when his train has arrived at the first prospective kiln or hopper. After dumping one of the cars he pushes one of the buttons which are placed at convenient points on the railing running along the back of the walk-way to move the second car into position. This button arrangement is the "remote control system," a combination of the principles of certain electrical apparatus, which has become standard in Cedar Hollow.

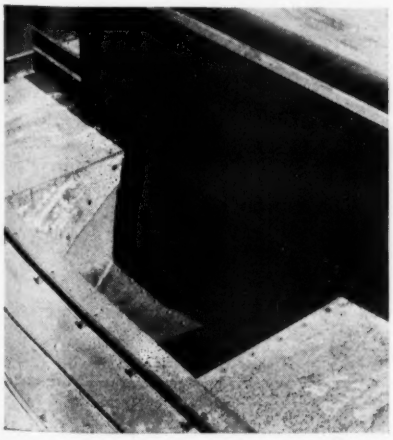
The many advantages of this contrivance are obvious. After spotting the

first car, which in some cases may be at the other end of the kiln battery from the hoistman's house, the operator can place the other car at the next dumping point without returning to the lever house. To be continually walking back and forth from lever house to cars would take a great deal of the hoistman's time and would necessitate two men on the job, namely a hoistman and a dumper.

Kilns No. 1 to No. 4 being torn down. Nos. 5, 6, and 7 wrecked. The new steel shells were four feet higher than the top of the former kilns, so the tramway which had served the older battery was raised to a height to facilitate proper connection to the new kilns

Kiln Lining and Insulation

All seven kilns are lined with an outer layer of common red brick and two inner thicknesses of a high-grade refractory type. A 2 in. thickness of "Sil-O-Cel" insulating material outside of the red brick surrounds the furnace and extends for a distance of 8 ft. up in the shell. All courses of brick are carried up 20 ft. above grate bar level, stepped back at 45 degrees and topped off with a very hard brick to withstand the scouring action of the stone. This leaves 15 ft. of storage room above, which is space enough to hold 40 tons of kiln stone, or a sufficient supply to carry over from Saturday noon to Monday morning.



A view of a coal chute from the roof of the hoistman's house

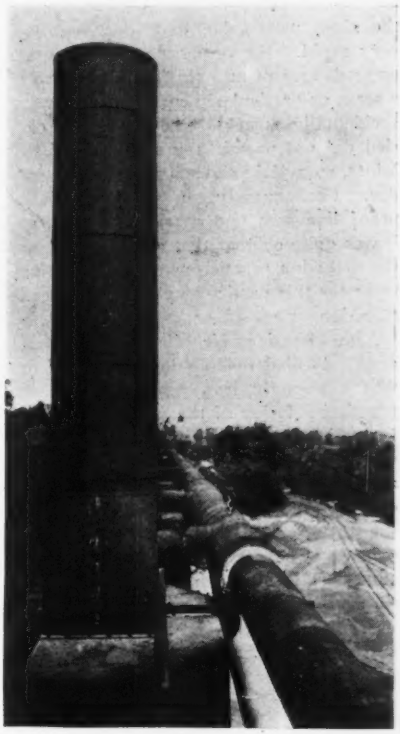
It was the original intention to give all seven new kilns the same curvatures in the lining—namely, a 7 ft. bore at grate bar level, and a furnace 37 in. deep and 42 in. wide, cutting a chord on this diameter equal to the width of the grate and bringing each opposing furnace edge 6 ft. apart. However, when two kilns were bricked up after this manner, it appeared quite evident that the flame would hardly penetrate the center of such a large mass of the stone from so small a grate area. Accordingly, the next three kilns had their bores reduced to 6 ft. 6 in., a kiln diameter which seems to produce the highest percentage of efficiency with Cedar Hollow stone.

The distance between furnaces of the two remaining kilns was made 5 ft. 9 in., the inboard furnace edge cutting a 42 in. chord on a 6 ft. circle. From grate bar level with a 6 ft. diameter bore, the lining funnels out to 10 ft. across at the top, 20 ft. higher up. This type of lining and furnace construction brings a smaller area of stone in contact with a much more unified flame and also allows a wider distribution of the hot gases throughout the preheating area after the actual burning zone is passed. The cooling section below could have been larger with advantage, but as the coolers of the old stone kilns were used, the only thing left to do was to taper them out to meet the larger bore of the new kilns at grate bar level.

As is generally known, a short cooler produces red-hot lime, which is indicative of poor efficiency. A large cooler, say half the capacity of the kiln above furnace level, will undoubtedly give a cooler product, the expectation being that the natural tendency of heat to rise will obviously pass on up the shaft and help in the burning zone. A possible step towards the general improvement of this cooler situation would be to drop the present discharge doors 4 or 5 ft. and remove the lime with small individual conveyors running off a common line shaft. This installation would necessitate a lowering of the entire floor at the discharge level. For the present, the previous method of handling the lime with two portable conveyors will be continued, the machines discharging into the cars running on 24 in. gauge tracks in front of the kilns. The lime is then hoisted to cooling bins, where it is sorted out to meet the demands of the trade.

Eldred Process of Combustion

The Eldred process of combustion is used. Briefly, this system embodies the use of a certain amount of inert gases sucked off the top of the kilns and fed through the grate with a certain proportion of induced free air. Consequently,



Looking down the wrought iron gas line from No. 2 kiln. This pipe was made up in the shop in all welded lengths long enough to span the distance between kilns

the flame, being slow in forming, passes up through the body of stone and a slow combustion is produced. This method of heat-treating lime with a good quality of gas coal containing a high percentage of volatiles gives very good results and has long since proven extremely efficient at Cedar Hollow.

This duplex gas system necessitates considerable piping and blowing devices. However, it is possible to operate without the air line and its fan, as was the case on the former kilns. This latter method, although used many years, had not proven entirely satisfactory, as the balance of air and gas which was obtained by regulating a large slide gate at the intake of the exhauster did not permit positive individual control of the various furnace conditions throughout the battery. Accordingly, a new line of sheet metal piping and a small exhauster were installed to supply air to each of the 14 furnaces. The original gas-air line was placed in its former position and carries top gases only.

Piping

The application of sheet metal piping for the purpose of conveying the top gases to the furnaces has by this time established its limitations at Cedar Hollow. On the original kilns the gas line was of this type and it had been necessary to renew the entire system every five or six years as the deterioration of the sheet metal, due to kiln gases, was very rapid. Furthermore, there was always danger of an occasional puncture if a seam or particularly corroded spot were accidentally struck. The hot gases carried did not permit any soldering of the joints, so a plain riveted seam had to suffice. Consequently, an absolutely leakproof line was not possible. Therefore, it was quite evident that a departure from the orthodox practice would be necessary to better this particular phase of the construction.

After considerable discussion it was finally decided that an installation of ordinary wrought iron pipe would be the practical solution of the gas line problem. Its resistance to corrosion as compared with sheet metal piping would presumably be in direct ratio to the differences in the thicknesses of the walls of the two pipes. Theoretically, then, fifteen or twenty years would be the possible duration of such a system. Due to the heavier metal and all the joints being welded, any recurrence of leaking connections or accidental punctures in the gas line would be impossible.

Exhauster and Gas Line

The original exhauster had been centrally located along the battery on ground level, and the position of the new line, as before, was to be along the front and at the top of the kilns. The connection of the blower to the trunk line was made with sheet metal piping as the weight of the wrought iron variety was deemed entirely too heavy for the available means of support or easy erection.

The middle section of the gas line was of a necessity the largest piece of the trunk, and had leads to each of the two adjacent kilns. Thus, from both its ends each succeeding length telescoped out, taking on a proportionate reduction upon arriving at the next kiln. The total drop in the size of the pipe from the middle to each end was from eighteen to ten inches. This decrease in diameter permitted the VanStoning of the male members of the telescoped joint. By packing thoroughly with asbestos rope and furnace cement, a gas-tight connection was secured having the effects of a slip-joint which will give and take with any kiln movement.

The leads from each of the seven kilns are of ten-inch wrought pipe welded into the main. Standard ten-inch cast iron elbows bolted to the top of the kilns are tied into the trunk line by a short section of sheet metal piping with a blast gate of the lever slide pattern. Following the regular practice, two wires extending down to the firing floor facilitate ready control of the draft. Small holes were drilled along the bottom of the entire line, the purpose being to permit the drainage of condensation and also to give ventilation in case the kilns are shut down, when condensation is at its worst.

The use of wrought iron pipe to convey top gases is certainly a marked improvement over the older method, although there is always that possibility of bad features revealing themselves in the course of time. While it is true that some little sheet metal was used, it is, however, in places where it can be easily replaced. Assuming that this mode of construction will be successful, the next step will be to construct a solid gas main of wrought iron pipe eliminating the use of sheet metal altogether. Notwithstanding the fact that a large fabrication and erection cost put the total initial charges of this gas line probably thirty per cent higher than a corresponding line of sheet metal, the ultimate service rendered should be the equivalent of the life of three sets of the superseded variety.

As a general proposition, this reconstructed battery of kilns should prove very effective. An increase of 0.3 to 0.5 per cent should be gained on the ratio of lime per pound of coal. As a result of making numerous changes to overcome the many deficiencies revealed by years of operation, together with the application of the more recent improved principles of kiln construction and operation, this battery of reconstructed kilns should give a high percentage of all-round efficiency.

Difference Between Agricultural Lime and Limestone

EXTENSIVE STUDIES conducted at the University of Gottingen, in Germany, are said to have failed to confirm the assumption that burnt lime changes completely into calcium carbonate in a short time in soil. Only a part of the lime combined with carbon dioxide, the remainder being adsorbed by the soil particles and leaving no free calcium hydroxide in the soil after a short time. The alkaline reaction of limed soil is attributed, in addition to calcium carbonate, to the calcium hydroxide separated again from the soil particles in small quantities by the action of water. It was not determined whether the lime adsorption was due to surface action or chemical causes or both.

Liming increased the adsorptive power of soils for other bases, such as potash and ammonia. The higher the content of fine particles in soil and the less adsorptively saturated it was, the greater were the amounts of lime fixed by the soil constituents. That part of the lime combining with carbon dioxide increased as the amounts of lime added increased. Generally, an equilibrium between the combining power of carbon dioxide (CO_2) in the soil particles and the adsorbing power of the soil was reached in a short time.

Calcium carbonate was transformed more slowly in soil than burnt lime. Caustic lime is therefore considered to be adapted for use on adsorptively unsaturated soils. Lime combined with carbon dioxide and with soil constituents was dissolved out by soil water containing carbon dioxide. It was also leached out in both combinations. The compounds formed by caustic lime in soil were not dissolved as rapidly by water containing carbon dioxide as artificially prepared aragonite.

It is the author's opinion that the greater activity of burnt lime in soil cannot be attributed wholly to greater solubility of its combinations with soil. More probably the lime adsorbed by soil constituents stands in some relation to the soil crumb structure. This point needs further study.

In dry soil rich in fine particles, such as loam and clay soils, enough water remains to slake caustic lime, resulting in a lime solution which cannot be duplicated by the action of calcium carbonate and water containing carbon dioxide. Adsorption results in an energetic crumb formation, which eventually causes a change in the physical structure of the soil.

Temperature Measurements

No. 1. Need for Scientific Temperature Measurement—Practical Suggestions for the Lime Plant

THE TASK OF TAKING temperature statistics is assigned to two spheres in the modern practice of lime burning, the sphere of scientific research and that of practical kiln management. Knowledge of and ability to utilize the scientific facts are mandatory to insure proper operation in practice. The data of scientific temperature measurements constitute an immense reference library by means of which we have arrived at our present knowledge of the theory of burning lime.

These data and the investigations into the temperature conditions are the foundation of further research. With the aid of scientific temperature measurements and the determination of the dissociation pressure between calcium oxide and carbon dioxide ($CaO : CO_2$) there are established all the constants with which the industry seems to be operating today as if a matter of course.

In every lime kiln three principal zones are to be considered:

(a) Cooling of the lime and heating of the combustion air.

(b) Calcining zone.

(c) Warming of the limestone and cooling of the stack gases. All of which require to be treated distinctly. A wealth of data were necessary and are necessary to afford reliable conclusions as to the working processes. Of the series of experiments which it is possible to conduct the following are suggested:

(a) At what temperature does the limestone disintegrate chemically (liberation of CO_2) and what influence on this process has the composition of the heated atmosphere in the calcining zone with reference to moisture and carbonic acid gas content?

(b) What effect has the air current or absence of current?

(c) How quickly and completely will limestones of various crystalline structures decompose, on account of the variation in their heat conductivity, capillary resistance and porosity?

(d) What temperatures will result in the quickest and most complete decomposition of the limestone?

(e) In cooling, is there any calcium carbonate formed?

It is not the purpose of this paper to enumerate actual figures which can be tabulated only after endless computation and are based only on innumerable experiments, but to make practical suggestions how to obtain such data for any particular lime plant. Three questions are to be considered:

1. Why are temperatures measured?
2. Where are they measured?
3. How are they measured?

All measurements undertaken in any industry serve a two-fold purpose, viz., to insure the required quality of product and in the second place to attain and maintain economic operation. These purposes are served when the temperature of the steam produced by a boiler is measured to determine its energy, and the temperature of the stack gases are taken to show how completely the fuel is utilized; when similar measurements are undertaken in a lime kiln the purposes are the same: economy and quality of product.

Introduction

THIS is the first of a series of articles on Temperature Measurements in Lime Kilns translated from the German articles appearing in the "Ton-Industrie-Zeitung," Berlin. ROCK PRODUCTS readers are particularly fortunate to have such a series of articles on this subject as it deals with one of the greatest shortcomings in the lime industry.—The Editors.

Importance of Temperature Statistics

To secure the highest quality of product, temperature statistics in kilns are essential to prevent underdone lime in the product on account of too low temperature, lime that has not been reduced to CaO as well as to prevent dead-burning. To attain economy, measurements are instituted, e.g., to save fuel. Each kind of fuel needs to be heated to a certain degree to induce combustion. Care is also taken to heat the air required for combustion (the draft). The higher this draft is heated the less heat is consumed within the kiln to raise it to the temperature of combustion, and consequently the more heat is available for the reduction of the limestone.

We also aim to utilize completely the heat energy contained in the stack-gases as far as the peculiarities of the stone and fuel permit. It is for this reason that the stack gases are allowed to pass through and heat the limestone as it approaches the calcining zone. As the combustion gases enter the stack, temperatures are measured to determine the degree to which the fuel energy has been utilized and the lowest possible temperatures would seem to indicate excellent utilization of the fuel energy. And yet this may be very deceptive. Stack temperatures may correspond very closely with the best known practice and still there may be serious waste of fuel. To illustrate, let us take the case of a steam boiler, where the conditions are simpler and the waste more apparent.

Boiler Firing

In boiler firing not only are the temperatures of stack gases and the strength of the draft considered, but more important than either, the stack gases are analyzed. When there is not enough draft, not all of the fuel is changed to carbon dioxide (CO_2) and carbon monoxide (CO) escapes through the stack. Carbon monoxide has a definite heat value, which, is, of course, a loss if allowed to escape through the stack. When there is too much draft, the excess of oxygen carried to the fuel escapes through the stack. In either case, whether there is insufficient draft or a surplus, the carbonic acid content of the stack gases is reduced; only, that with too little draft combustible carbon monoxide replaces the carbonic acid, with too much draft oxygen replaces it. Also in either case the pyrometer in the stack will show the same low temperature. In the one case energy is lost with the combustible CO; in the other case, unnecessary amounts of air of combustion are heated to stack temperatures.

It is evident also that temperature measurements alone have failed in either case; the low stack temperature may deceive and only an analysis of the combustion gases and corresponding regulation of the draft can lead to the greatest fuel economy. A further case is possible: the presence of both oxygen and carbon monoxide in the stack, and this may be caused by too great a depth of fuel on the grates. By this error such a high temperature may be attained within the fuel bed (not in the gases) that there is a decomposition into CO and O representing a considerable loss in heat. The stack temperature would again be low.

This illustration has been carried out at some length to emphasize the fact that temperature statistics alone will not lead to economic firing since what is true of fuel consumption in generating steam applies in lime burning.

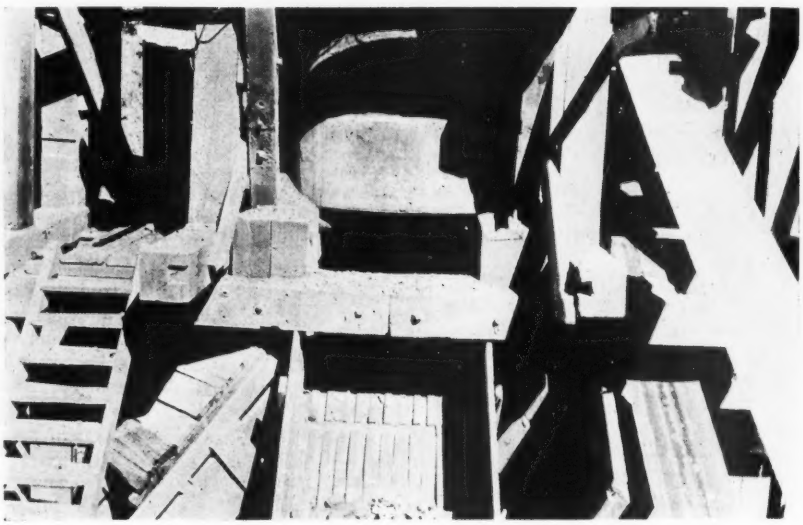
(To be continued.)

Hints and Helps for Superintendents

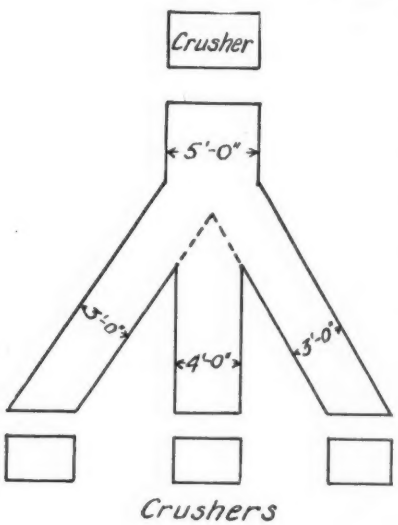
Chute Lining

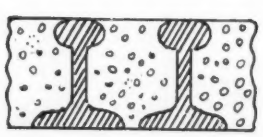
SEVERAL examples for the use of crushed stone for lining chutes have already appeared in ROCK PRODUCTS. Herewith is possibly a slight improvement over this method of lining chutes found at the plant of the Delaware River Quarry & Construction Co., Lambertville, N. J.

The chute is lined with 20 lb. rails and the spaces between the webs and heads of the rails are filled with concrete, which takes care of the wear. In any event the rail heads are bound to last as long as the plant, and this method of lining chutes provides a good use for old rails.



Chute from jaw crusher. Note lining in chute





Chutes and section of chute lining

The arrangement of the chutes at this plant are also quite unique, in that one fan shaped chute delivers to three jaw crushers, all in line with each other. As is shown in the accompanying sketch, the initial jaw crusher, a 36x48 in., discharges directly into a chute 5 ft. wide, which deposits the stone to a 24x36 in. jaw crusher. When this jaw crusher has more stone than it can handle, the stone backs up the chute forming a "V" at the mouth and the stone from the initial crusher is side chuted to either or both of two 13x24 in. jaw crushers.

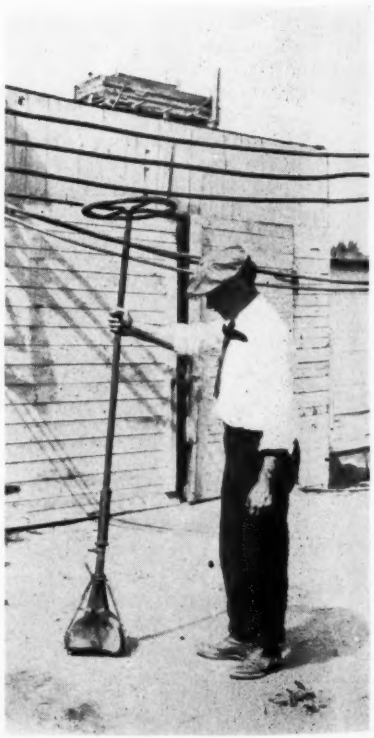
R. A. Montgomery is president of the Delaware River Quarry and Construction Co., and R. M. Montgomery is vice-president.

Prospector's Clam-Shell Bucket

THE illustrations presented herewith show a clam-shell device that can be used for prospecting or sampling gravel or sand deposits. This device was developed at the Ajax Sand and Gravel Co.'s plant near Bedford, Ohio, of which Roy Black is president and general manager.

As can be seen from the photograph, the miniature clam-shell bucket is but a replica of its older brother and is opened and closed by means of toggle joints that are actuated by a screw operated from the handwheel shown on top. The fittings were made of old pipe and the bucket can be made of old elevator buckets. The advantage of taking a sample with a device of this nature is that it is absolutely positive in its action. Once the sample is obtained there is no chance

Details of bucket



Prospector's clam-shell bucket

of losing any of it, as is sometimes encountered when core drills are used.

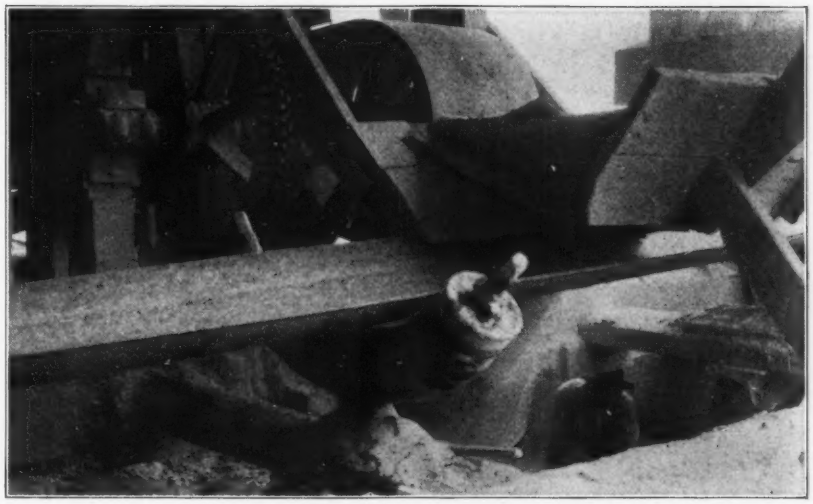
Selecting the Right Pulley

By W. F. Schaphorst, M. E.

NEARLY EVERY pulley has something to commend it, whether low first cost, lightness, reduction of slip, convenience of application, etc. The most important of all factors in the writer's mind is the elimination of slip which costs many thousands of dollars per year in the United States. It is safe to say that through the improper selection of pulleys our manufacturing plants are losing thousands of dollars daily. In many of these plants pulleys have been chosen with an eye on the low first cost rather than on ultimate cost with a resulting waste of power, fuel and time that is astounding.

During recent years the writer has been looking upon steel split pulleys more and more favorably. They have a number of advantages over other pulleys. When new, both cast iron and wood pulleys do very well, but after they are in use they do not work as satisfactory as steel pulleys or pulleys with steel faces.

A steel pulley does not swell upon getting wet and does not shrink upon getting dry. Atmospheric conditions have no influence whatever. Therefore, due to the fact that there is no swelling or shrinking when a steel pulley is once made tight on a shaft, it remains tight and does not slip, and therefore does not require re-brushing and re-facing every little while. The steel pulley does not glaze the surface of the belt or become slippery due to liberated carbon as does a cast iron pulley. Steel pulleys also are immune to fire. They are not so liable to break as cast iron and of course they will not burn like wood or paper pulleys. The wood pulley has a disadvantage in that it is a poor conductor of heat, consequently if there is much slipping the pulley may heat up to the ignition point and start a fire. The steel pulley, on the other hand, is a good conductor of heat. The heat due to slip or creep simply passes through the rim and is then radiated out into the atmosphere. On an average the steel split pulley is 40 per cent lighter than the cast iron pulley and can be applied to the shaft without taking the shaft down. No set screws are required and only under exceptional circumstances is there an advantage in using a keyway.



Belt conveyor feed

Belt Conveyor Feed

THE VIEW HEREWITH shows a plant detail often neglected. The 36-in. belt conveyor in the foreground takes the crushing plant output to a car-loading chute. It passes under one end of a row of storage bins, which are provided with a belt conveyor at right angles, so that any one or more of them may be tapped and the contents delivered to the loading-out conveyor.

Unless the discharge of the cross-conveyor is properly taken care of, there will be excessive wear on it. The hopper receiver shown herewith is intended to feed the conveyor without excessive wear. It allows the fines to drop on the belt first and cushion the blows of the larger fragments. Also the hopper itself takes the major part of the wear and abrasion of the falling stone.

The belt is troughed more than is usual practice. Also the belt rollers are on an axis of unusual design.

Blast-Hole Drilling Costs

THE CARD shown herewith is a daily record of "Big Blast-Hole Drilling Costs." There is a space for all cost items, both direct and indirect. The wage costs are taken from the individual workman's daily time card. The method of determining fuel cost depends on the kind of power or fuel used on the drill and system used at the particular plant in requisitioning or recording material. Rope cost is considered as a direct cost and can be determined by taking an average of the life of individual cables. Bit dressing may be omitted if the work is done on the job by the driller, otherwise it is taken from the plant blacksmith's daily time card. The item overhead includes interest, depreciation, repairs, renewals and superintendence on the drilling outfit and main plant overhead. This is usually a fixed item for given periods, but should be checked at frequent intervals.—*Big Blast Hole Drills,* published by Sanderson Cyclone Drill Co., Orrville, Ohio.

DAILY DRILLING COST RECORD

DATE	DRILL NO.	DRILLER				HELPER				EXTRA HELP				TOTAL WAGE COST	FUEL COSTS	ROPE COSTS	BIT DRESS. COSTS	OVER-HEAD COSTS	TOTAL COSTS	No. FT. DRILL'D	COST PER FOOT
		KEY	RATE	HOURS	COST	KEY	RATE	HOURS	COST	KEY	RATE	HOURS	COST								

Big blast hole drilling costs

Creating a Bank-Run Sand and Gravel Business

J. Fred Smith Gravel Company, Dallas, Texas, One of the Largest Producers in State—How Business Developed from Belief in Good Roads

IN the Summer of 1911, J. Fred Smith, a prominent citizen of the town of Celina, Tex., became interested in civic improvements, and more particularly in improved roads. Looking about for suitable material to build good roads naturally led him to make an exhaustive survey of road building materials in his own immediate vicinity and after complete investigations he came to the conclusion that the gravel to be found along the Trinity River, north of Dallas, offered the best natural road building material to be found. This marked the beginning of the J. Fred Smith Gravel Co.

Pit at Farmer's Branch. Loading Operation

In starting this business, Mr. Smith had no precedents to follow. His idea of organizing the J. Fred Smith Gravel Co. was to boost the town of Celina by graveling all its streets. Mr. Smith was also a man of vision and he foresaw that the road building industry was one of the future and that when its time did come it would assume large proportions.

Difficulties Encountered

Being unacquainted with the gravel business Mr. Smith started to excavate his gravel deposits by means of small steam shovels. He soon found that these proved to be inadequate, since most of the pits were flooded, and also it was impossible to get anything like the capacity desired out of the shovels.

His next difficulty came in stripping the over-burden from the gravel deposits. The dragline excavator was unheard of by him. The difficulties encountered by the small steam shovels were not due to any mechanical fault in the shovel itself, but rather to the impossibility of success-

C. H. Jackson, sales manager

Portion of flooded pit

Rear end of shovel at Farmer's Branch Pit

Pit at Farmer's Branch. Excavated portion

Portable pump and gasoline engine used to drain pits

ful operation of any steam shovel under the ground conditions existing. With the light shovels it was necessary to keep the pumps working day and night to prevent the shovels from floating away in the bottom of the pit.

Mr. Smith finally came to the conclusion that heavier shovels with longer booms or dragline excavators would solve the difficulties of operation. He had some

Pit at Farmer's Branch. Another view of steam shovel loading operation

made and these difficulties being settled he turned his energies toward selling gravel and "jumped from the frying pan into the fire." The need of good roads was not appreciated and J. Fred. Smith had gravel pits and shovels, but no one to sell gravel to.

Built a Mile of Sample Road

Again Mr. Smith showed his perseverance and fidelity to his purpose by operating for a whole year at a complete loss. He built a mile of sample road from his own personal funds. He talked good roads until the little town of Celina voted a bond issue for road and street improvements. The agitation was started and the counties in northern Texas began to vote bond issues for roads. Then the railroads began to demand gravel for ballast and for gravel for concrete work. Thus the J. Fred Smith Gravel Co. developed from a patriotic idea into a growing industry that in the year of 1916 produced some 400,000 tons of gravel.

This company operates pits today at Farmer's Branch, Letots and Carrollton, Tex., from whence pit-run gravel is produced that is naturally clean and makes a good aggregate for all kinds of concrete work. It is from this source that the company derives its greatest revenue today.

The Letot pit is located on the Missouri, Kansas & Texas Ry., and the deposit here consists of Trinity River bottom gravel, composed of 65 per cent gravel and 35 per cent sand. This deposit contains an average overburden of 6 ft., under which is from 12 ft. to 16 ft. of gravel underlaid with a shale. The overburden is stripped and the deposit excavated with a dragline excavator, with a 2-cu.-yd. dipper.

The pits at Farmer's Branch and Carrollton have the same general characteristics as the pit at Letot, being of the Trinity River deposit. The Farmer's Branch pit is located on the Frisco Railway and is excavated by a railway 90-ton steam shovel, with special boom and dipper stick, measuring 35 ft. and 22 ft., respectively, with a 2-cu.-yd. dipper. This shovel loads from the pit direct into cars. The operation is illustrated in one of the accompanying photographs. A 5-in. portable centrifugal pump operated by a 6 h. p. gas engine is used to drain the water in this pit.

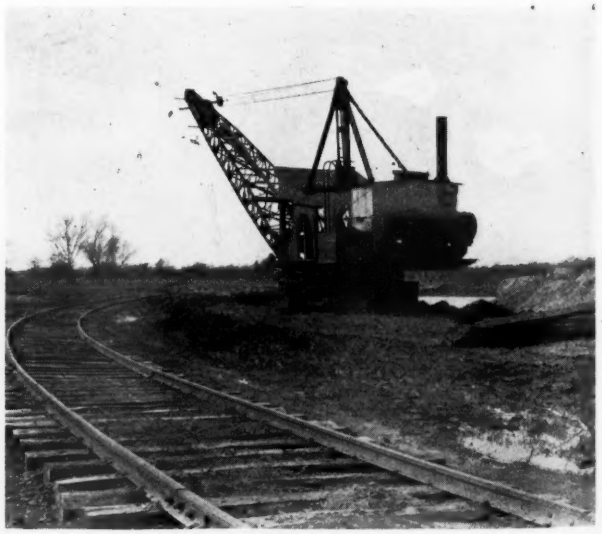
The pit at Carrollton is situated on the Cotton Belt Railway and is excavated by a dragline excavator of the caterpillar traction type, with a 2-cu.-yd. bucket. A pump and gas engine similar to the equipment mentioned above is used to drain the pit in case the pit should become overflooded.

The company can load from 35 to 50 cars of gravel with the 2-cu.-yd. dragline excavator and from 50 to 85 cars per day with the 90-ton steam shovel. About 1,200 acres of land containing about 3,000,000 yards of gravel are the remaining sources of supply.

J. Fred Smith is no longer connected with the company that bears his name. After the orders started to come in, having accomplished his object in getting good roads and the good roads material business started, he entered other fields of endeavor.

The president of the J. Fred Smith Gravel Co. is John W. Rhea; vice-president, A. A. Fielder; second vice-president, J. McNally; secretary-treasurer and general manager, Rhea Miller; C. H. Jackson, sales manager, and John Locker, superintendent.

Dragline excavator at Letot Pit



Another view at Letot

Sand Settling and Sand-Settling Devices

Part II—No. 10—Classification—Cone and Pyramid Classifiers

By Edmund Shaw
Allen Cone Co., El Paso, Texas

THE CLASSIFIERS WHICH have a cone or inverted pyramid above the sorting column, to receive the feed, are the commonest type of all. In describing them the word cone will be used, since it is more often employed than the pyramid, and the action of the two forms is the same. The function of the cone is to provide settling area. In this area the current from the feed launder loses its

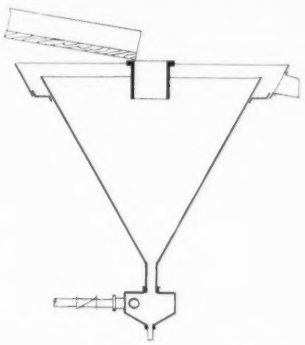


Fig. 34. Plain cone classifier

velocity and allows the sand to fall. The sides of the vessel have to converge in order to bring the settled sand to the sorting column, where it may be dealt with by the rising current, and hence the conical shape.

Cone classifiers do very well where their function is merely to remove clay, or "de-slime," as this process is called in ore mills. In such work the only sand that goes to the overflow is the very fine sand, which has such a slow settling rate that it will rise in almost any upward current. The type of plain cone classifier shown in Fig. 34 will answer very well for such work. But where the separation is to be made on any mesh coarser than 200 the cone takes on the character of a necessary nuisance, since it introduces the problem of the neutral grains.

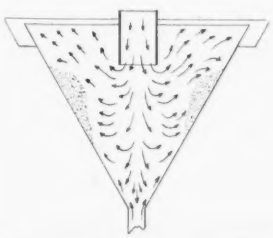


Fig. 35. Diagram illustrating the formation of banks

These are grains that cannot escape from the classifier at either the spigot or the overflow, and the reason is not hard to understand if one considers the diagram marked Fig. 35. Feed is admitted to the inlet spout and the grains go two ways. The lightest grains go at once to the overflow and out. The heaviest grains go to the sorting column, and being able to fall against the rising current, they also go out by way of the spigot. But between these two there is a class of grains which is too heavy to go out with the overflow and too light to fall against the current in the sorting column, and these have to stay in the cone. They may be caught in an upward current and

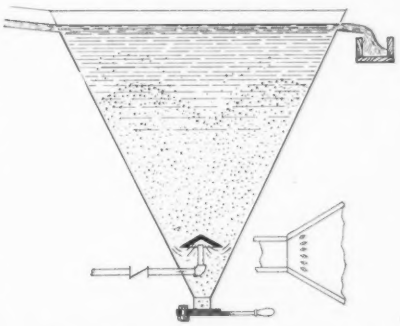


Fig. 36. Surface current classifiers with distributing apron

carried toward the overflow, but this upward current gets less as it reaches the larger area in the upper part of the cone, and the velocity slows down to where these grains are dropped. Eventually they come to rest on the side of the cone, and when enough of them has accumulated a "bank" is formed.

Later, this "bank" is sure to cause trouble, for it will slough off and slide down to the sorting column in a mass too heavy for the hydraulic water to lift. Then classification stops and the cone begins to fill with sand. And life has many experiences which are pleasanter than washing out a plugged cone classifier at 2 a. m. on a cold winter morning, as the writer hereof can fully testify.

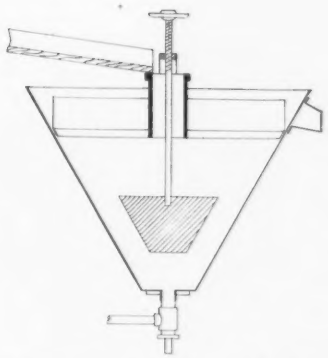


Fig. 37. Cone with central filler

Defects of Cone Classifiers

That this trouble was an inherent defect on the conical shaped settling vessel must have been recognized about as soon as cones began to be used, and a number of designers and inventors have tried to remedy the defect. Rittinger, who may be called the father of classification, introduced the surface current classifier. Since the feed was not sent down into the body of the device (in this case, an inverted pyramid), no currents were formed and everything that fell out of the surface current went to the spigot. Other designers using the pyramid form sent the feed in from the edge and down the side to wash away any bank that might form. Still others used jets of water to break up the bank. Delano used a block or "filler" in the center of the classifier, which sent the feed down through a narrow space at the point

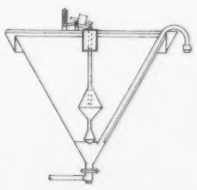


Fig. 38. Allen sand washing cone with actuator

where the banks usually form. An ingenious Arizona mill man tapped the cone on the side and drew off the neutral grains and added them to the overflow. Allen has put an automatic device in the cone which controls the opening between the sorting column and the cone. When the grains begin to accumulate this open-

ing is made larger so that the neutral grains have a chance to pass out of the spigot.

The Surface Current Classifier

Rittinger's surface current classifier has not found very much favor, probably because it has to be made rather long to give sufficient run to the current. This length means depth and depth uses precious mill height — headroom. Then the surface current itself is open to objection. Professor Richards studied it many years ago and showed how a downward current was always formed at the overflow lip. Nevertheless, the writer has built two or three classifiers of this kind and found them very satisfactory in their work. One of the best forms he has seen (not of his design) is shown in Fig. 36.

This particular model was 6 ft. by 6 ft. at the top, the sides forming an inverted pyramid with about 60 degrees of angularity. The feed was brought in from the launder over an apron, the full width of the classifier, and fingers were placed to spread it, as shown in the detail. The heavier grains dropped out to form what appears to be a sand bed in the cut, but which was really a mass of teetering grains. The hydraulic water was admitted under considerable pressure and the pipe was brought in so that the stream struck a conical spreader, which presumably sent the water to the sides, making a sort of diaphragm through which the falling grains had to pass. There was no true sorting column in the ordinary sense of the word, but this diaphragm and the space above it served the same purpose. The coarse discharge was remarkably free from unwanted fines.

It will be seen that this classifier was a combination of surface current and hindered settling classifier, as the bed of teetering grains brought it in the hindered settling class. The regulation was by opening and closing the valve shown at the spigot orifice, and it required considerable attention to keep it running well. A small aperture had to be maintained at the spigot or the spigot discharge would contain too much water, and this small opening gave constant trouble by choking with pieces of oversize and trash. Aside from this, the work of this classifier was exceptionally good.

Classifier With Center Filler

The use of a centrally disposed "filler," to throw the descending current to the side, and thus wash away the neutral grains that would otherwise lodge on the side, is very old. The patent office records show a number of inventions in which this idea has been applied.

Fig. 37 shows such a classifier, the design being substantially that of a device used in the Missouri lead mining district. The settling basin is an inverted pyramid, made of wood, and the filler is a wood block, which may be raised or lowered by the hand screw shown. There is some classifying effect in the channel between the filler and the sides of the pyramid, so the device in some respect resembles the *spitzlutte* described in the last number.

The idea of a central filler seems an excellent one, but so many classifiers of this type have been designed without any of them coming into extended use that it is probable that it does not do all that is expected of it in a commercial machine.

Allen's Actuator

This method was first applied to a classifier for very fine material, the idea being to keep the density of the spigot discharge the same in spite of variations in the feed. It did this very well, and the principle of controlling a discharge orifice by the density of a body of pulp above it was found to be so good that it was applied to ordinary sand classification.

The governing device in this machine is called the "actuator." It has the shape of a double cone, to prevent material from settling on the sides. The weight of the actuator is such that it will neither sink nor rise in clear water.

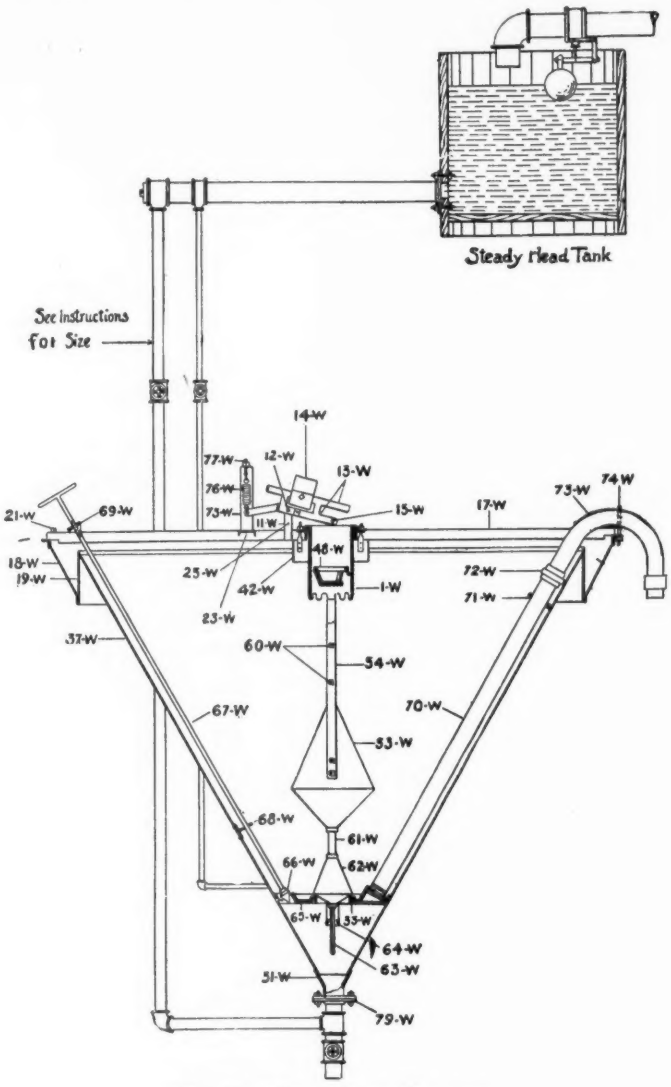


Fig. 39. Allen sand-washing cone

When a fluid contains particles in suspension, it has the same floating power as a true fluid of the same density. Any increase in the number of suspended particles increases the density, and gives it the power to float a heavier body. This is the theoretical principle on which the work of the machine depends.

As the feed, sand and water is run into the machine, the neutral grains constantly accumulate, as has been explained in an earlier paragraph. These grains

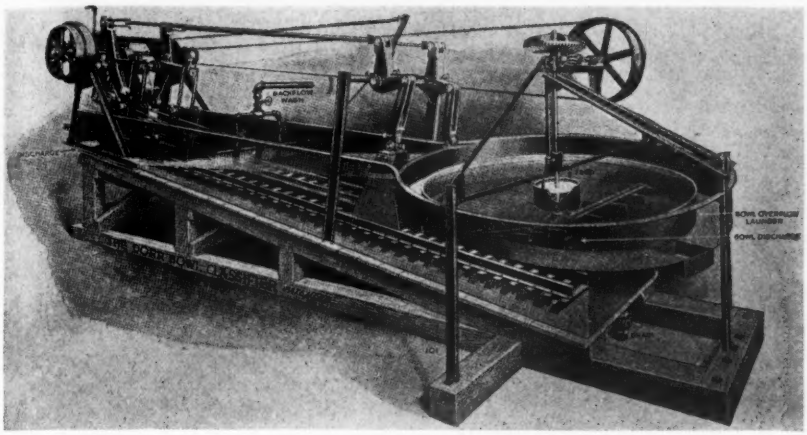


Fig. 40. Dorr bowl classifier

stay in suspension for a time, before they go to the sides and lodge there, and this increases the density of the contents of the cone.

Referring to Fig. 38, the actuator is shown in the position in which it is suspended in the pulp that fills the main cone. The accumulation of neutral grains causes it to rise, and in rising it lifts a valve at the lower end that closes an orifice at the top of a very short sorting column. Because it is regulated in this way, the sorting column does not have to be so long as in other forms. The hydraulic water is supplied from a water chamber below. The more the neutral grains increase, the higher the actuator rises, and the greater the opening that is given for the grains to pass out. The neutral grains go out in this way instead of accumulating further in the cone, and when their number is sufficiently reduced the actuator sinks and partially closes the opening to the sorting column.

By using this method of regulating the sorting column, it has been possible to construct very large hydraulic classifiers, much larger than could be built on the ordinary systems to do successful work. There are several of these machines which have cones 14 and 16 ft. in diameter in regular use. The discharge of these large machines is by means of a siphon in order to reduce the head, which would otherwise give too great a velocity to the discharge. This also reduces the head room required.

Dorr's Bowl Classifier

In this machine, shown in Fig. 40, the difficulties attendant on the use of cones and inverted pyramids have been overcome by keeping the contents in slow agitation. The cone is very flat and it is swept by rakes attached to long arms, and these rakes keep the heavy particles from settling on the cone and sweep them down to the discharge orifice. This orifice opens into a water chamber, as in the machine just described, and the hydraulic water is admitted to this water chamber.

The solids which fall into the water chamber are taken out by a lifting conveyor, or ladder conveyor, which is the same as that used in the Dorr classifier previously described. The solids are thus discharged with a very low moisture content.

Although from its form this machine could hardly be said to belong to the cone and pyramid classifiers, since the upper part is only a conical bottomed flat tank, it is included with them, as the action is more or less the same. That is, the tank with its rakes to bring the material to the center may be considered the equivalent of the cone with steeply sloping sides. The application of this machine is also to the same type of material as the cone and pyramid classifiers; that is, to the comparatively fine sands which require a considerable arc in which to settle. It is made in large sizes, those which the writer has seen being 15 ft. in diameter.

(To be continued)

Limestone Quarry Operations of the United States

REPORTS RECEIVED by the United States Bureau of Mines from operators of limestone quarries throughout the country show that the industry employed 43,151 men in 1920 for an average of 259 days each, or 11,154,653 shifts for all employes. These figures indicate increases as compared with 1919 of 8 per cent in the number of men employed, 12 per cent in total shifts worked, and 4 per cent in average working days per man. There was also, unfortunately, an increase in accidents, the reports showing that 96 men were killed and 5,321 were injured, or 31 more deaths and 890 more nonfatal injuries than occurred the year before. The accident rate was 2.58 killed and 143.11 injured per thousand men employed (300-day workers). The corresponding rates for the previous year were 1.97 killed and 134.05 injured.

Men employed in the quarry pits proper, as distinguished from the crushers, or outside rock-dressing plants or mills, numbered 29,226, and worked 7,343,112 shifts, or 251 shifts per man. Those employed at the outside plants numbered 13,925, and they worked 3,811,541 shifts, or 274 shifts per man. Accidents inside the quarries caused 74 deaths and 3,590 nonfatal injuries, while those occurring outside the quarries resulted in 22 deaths and 1,731 injuries. The accident rates for the quarries proper were 3.02 killed and 146.67 injured per thousand employed, corresponding with rates of 2.24 killed and 136.44 injured for the previous year. For the "outside" works the rates were 1.73 killed and 136.25 injured, as compared with 1.40 killed and 129.04 injured in 1919.

Of the principal limestone-producing states, those showing decreases in accident rates during the past year were Michigan, Texas, West Virginia, Maryland, Indiana, Missouri, Oklahoma and New York, while increased rates were noted for Kentucky, Pennsylvania, Illinois, Ohio and Alabama. Michigan showed the most notable reduction in the accident rate, the decrease in the number injured being equivalent to 66 for every thousand men employed. The largest increase in the injury rate was in that for Kentucky, there being 52 more injuries for every thousand persons.

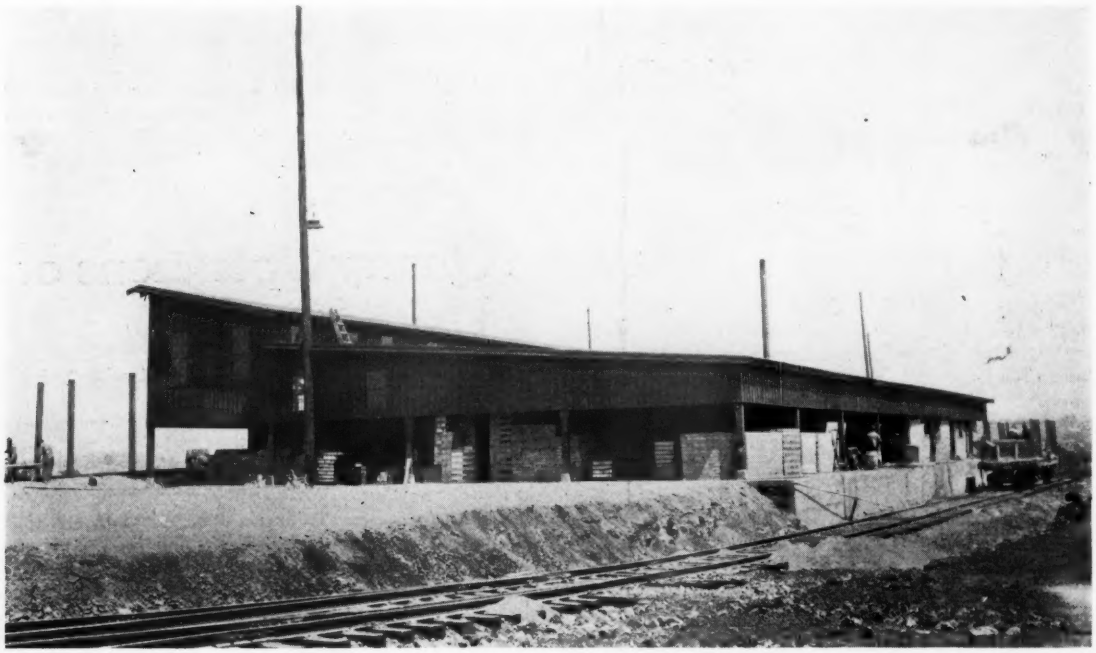
Considered by causes, practically all classes of injuries occurring inside the quarries were more numerous than in 1919, except in the case of falls or slides of rock or overburden, which declined from 349 to 322, and injuries resulting from burns, which fell from 70 in 1919 to 59 in 1920. The net increase in injuries occurring inside the quarries was 538. The net decrease in accidents at the plants outside the quarry pits was 352, and the only injuries showing a decrease were those caused by handling rock by hand, which fell from 83 to 40. Accidents from electricity at the outside works injured 26 persons, the same as in 1919.

Limestone quarries usually employ about 50 per cent of all quarry workers in the United States. The principal producing states are Pennsylvania, Ohio, Michigan, Illinois, Indiana, New York, West Virginia, Alabama and Missouri.

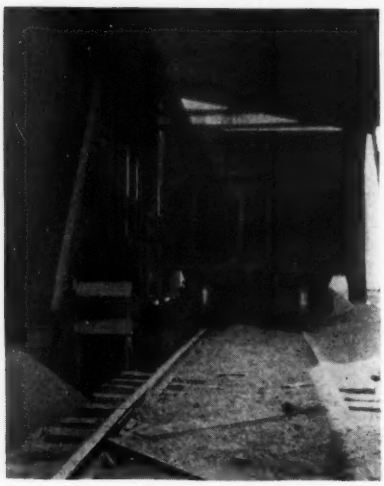
Slag Company Manufactures Concrete Brick

Birmingham Slag Company, Birmingham, Alabama Has New Face Brick Plant at Ensley—Shope Process Used

THE SUCCESS OF CONCRETE BRICK made under the Shope process was described at length in the June 19, 1920, and March 26, 1921, issues of Rock Products. Since then plants to manufacture these brick have sprung up in various parts of the country, the latest being built by the Birmingham Slag Co. at Ensley, Ala., where the company also has one of the most modern slag crushing plants in the world.



General view of plant, loading side, Birmingham Slag Company

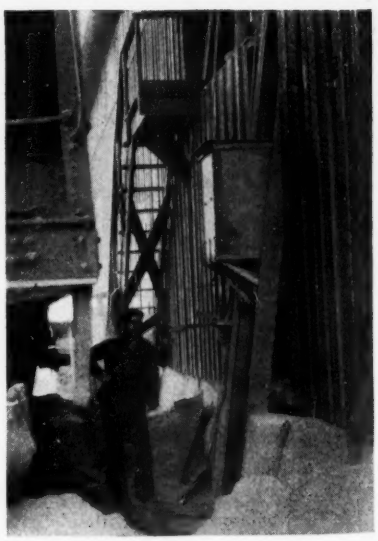


Dumping slag into pit

This company is probably the only one manufacturing concrete brick with slag as an aggregate, but under the Shope process the company is not only turning out common brick, but also face and mantel brick that can compare with clay and shale face brick of any and every quality.

The Birmingham Slag Co. owns the rights to manufacture this brick in Jefferson County, Alabama, and has recently completed a $50,000 plant with a capacity of 30,000 brick per day. The brick plant adjoins the slag pit and slag crushing plant.

The slag used as the aggregate for the brick is No. 7 "Ensley Basic Slag," ¼ in. to dust in size. The slag is taken direct from the mill to the brick plant in regular open top, hopper bottom cars and unloaded directly at the measure box, which is right below the mixer.

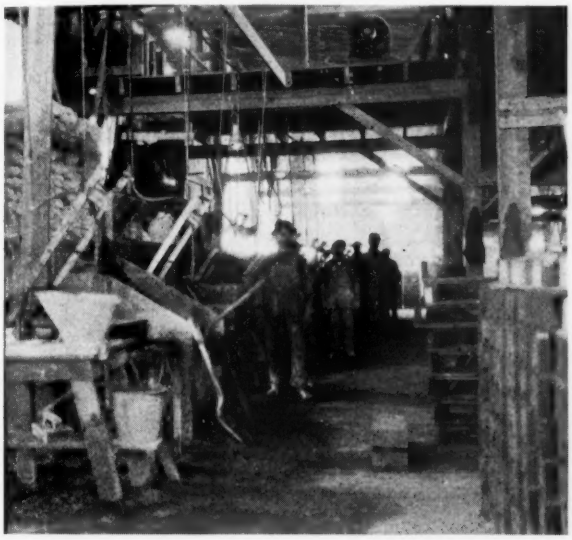


Skip or measuring box

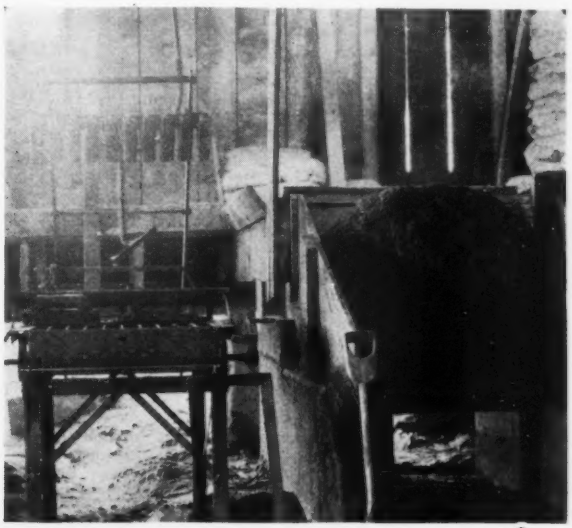
Plant Design

The plant is a one-story affair, 160 ft. x 116 ft., including kiln and boiler rooms.

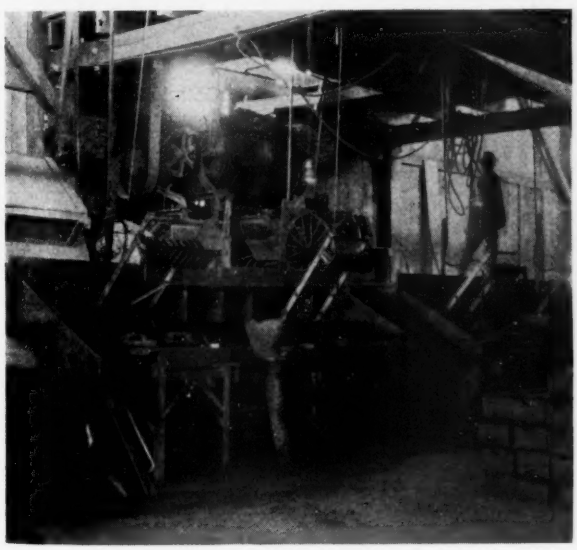
It has concrete floors throughout and is equipped with 10 concrete tunnels, 10x 5½x30 ft., which serve as the kilns or curing rooms. The building itself is of heavy frame construction. Brick was not used here because of the extremely good weather that prevails almost all of the time. The plant was designed from a standpoint of efficiency and in its construction the company spared no expense when it came to installing modern devices so as to facilitate increased efficiency.



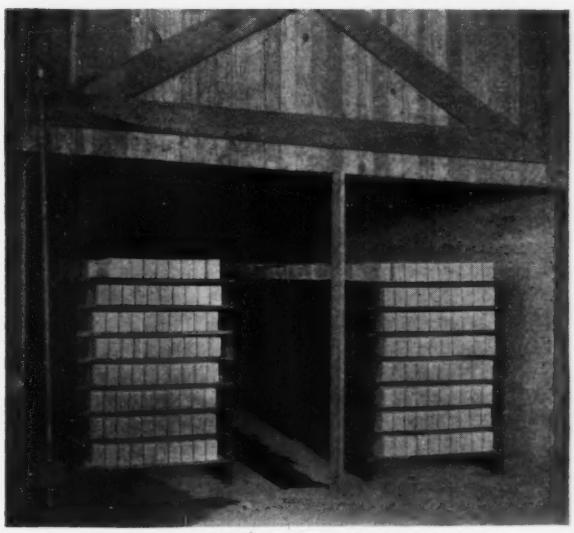
General view in plant. Note raised platform for mixer



One of the presses, showing tampers and flexible hose for water



Mixer, presses and mix bins



Kilns with pallets of brick

Mixing Operation

As mentioned previously, the slag is dumped into a pit into which a measure box drops until the top of the box is flush with the floor of the pit. As can be seen from the accompanying photographs, the measuring box is merely a skip hoist that carries the aggregate up over the mixer and automatically dumps into it. The skip is controlled by an electric cable hoist and the distance from the bottom of the floor to mix box is 18 ft.

As the slag is dumped into the 14 cu. ft. mixer, cement is added by the attendant, who operates mixer and distributes the finished mix to the brick machines. The mixer is situated on a platform 6 ft. above the brick machines. As the cement and slag are mixed, water is added through a perforated pipe over the mixer. The resulting spray tends to obviate considerable dust incurred during the mixing process.

As a batch is completed the attendant at the mixer dumps the material into a cart and delivers it to a mix box located between two brick machines. Along this platform are ten brick machines and five mix boxes. The mix boxes are built on concrete supports. The accompanying views show the brick machines, mix boxes, mixer, etc.

Brick Manufacture

The man at the tamping machine takes the mix from the bin at his side and fills the moulds. The bricks are made face-up and after thorough tamping the surplus material is struck off. The operator then adds the proper amount of water and color to the face of the brick, which he thoroughly agitates and works into the body by means of a wooden float made especially for this purpose. This operation gives the brick a base color and

creates a density of from 1½ to ⅝ in. in the body of the brick, so that when the brick is laid up with a stripped or rodded joint it will be impervious to water. The finishing color is then applied and worked into the base color through a stippling process for a tapestry finished brick and with various other finishing tools, where other patterns are desired. The application of the finishing color completes the process of waterproofing.

The water used by the operator at the tamping machine is brought down through a flexible gooseneck hose, with a counter balance attachment to automatically lift it out of the machine when tamping. The hose has a special attachment at the end which enables the operator to spray the brick with an 8 in. needle spray. The water is turned on automatically when the operator pulls the hose down into position.

After the brick have been "slicked" the operator lifts them from the machine by a rack and pinion arrangement, which leaves the pallet on the machine free. He places this pallet directly behind him, from where it is taken and conveyed to kilns or curing rooms. Only one off bearer, with a pneumatic tired truck, is needed to take the brick away from all the ten machines.

Curing Rooms

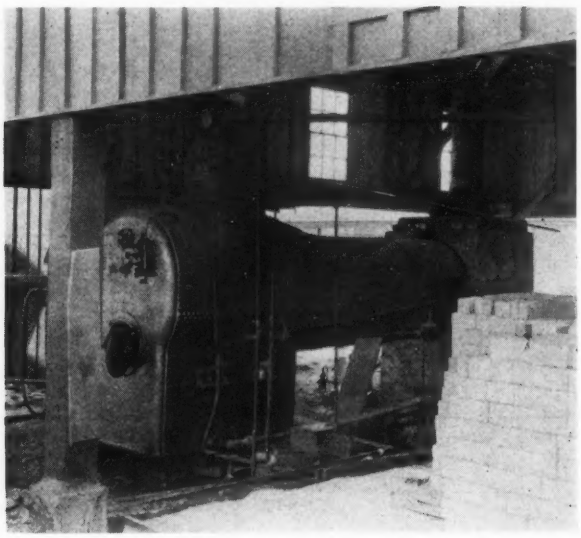
The ten curing rooms have counter-balanced drop doors and each room can handle 6,000 brick in 24 hours. The loading track is 26 ft. from the curing rooms and 4 ft. lower than the floor of the plant. A steel plate 4 ft. wide leads from the plant to the car. The company claims that this installation will make the loading of brick into box cars much cheaper.

The steam for curing is generated from an old reclaimed locomotive boiler pictured in one of the accompanying photographs. The steam is forced through perforated pipes running throughout the entire length of the curing room in an 8 in. trough of water. This gives the moisture necessary for the proper hardening of the brick.

The plant is constructed in such a way that only 20 men are required for the production of 30,000 brick. This number also includes the loading crew. The plant is also well situated to supply the demand for brick in Birmingham and at a recent "Own Your Home" exposition in Birmingham, the Birmingham Slag Co.'s exhibit proved to be one of the most interesting there. There is no doubt that this company will make a success of their new venture. It markets its products under the trade name of "Slagtex."

Personnel

The officers of the Birmingham Slag Co. are: C. L. Ireland, president; H. G. Ireland, vice-president and general manager; C. E. Ireland, sales manager, and G. C. McCullough, secretary and treasurer.



Boiler for generating steam

Shope Brick Abroad

Development of 150 houses at Ford City, Ontario

THE SHOPE BRICK CO., Portland, Oregon, has obtained a contract from Shanke and Co., contractors of Chicago. Ill., for a 75-unit concrete brick plant, with a capacity of 125,000 face brick daily, to be erected in South China. The plant will represent an investment of $250,000 and will operate with a working capital of $250,000.

Shanke and Co., who were contractors for the Speedway Hospital at Maywood, Ill., have obtained a large industrial contract from the President of the South China (Canton) republic, contingent upon floating a $100,000,000 loan in this country.

The brick plant will be operated as a government enterprise and the government will receive two-thirds of the entire profit, the other third going to the Shanke and Shope interests.

Mr. Shanke has two sons, one an engineer and one an architect, who are engaged in industrial work in South China. Mr. Shanke, Sr., made this contract with the President of the South China Republic and he is now gathering the industries that are necessary to China's progress.

The accompanying photograph shows a recent success made by the Shope brick in Canada. It pictures the development of 150 houses at Ford City, Ontario, which are being built entirely of Shope brick, made by the Rustic Brick and Supply Co. of that city.

The Utilization of Waste Slate As a Filler

Investigations by Bureau of Mines Show Many Uses for Waste Slate

By Oliver Bowles
(Mineral Technologist, Bureau of Mines)

THERE HAS BEEN OUTLINED in a previous report* the results obtained regarding the adaptability of pulverized waste slate as a filler in road asphalt mixtures. As pointed out in that report, the percentage of waste at slate quarries is very high, and the Bureau of Mines has undertaken the problem of discovering new and enlarged outlets for the waste material.

Many products, such as paper, rubber, road asphalt, floor coverings, paints, etc., require as one of their important constituents a considerable percentage of finely pulverized inert mineral matter to give "body," to obtain the desired consistency, or to supply the necessary wearing or other qualities demanded. Such materials are known as "fillers." The possibility that slate flour might be used as a filler with advantage in several products other than road asphalt led the bureau to undertake further investigation.

The Importance of Discovering Advantageous Uses

It has been found that in some products slate may be substituted for materials now in use without any marked effect on the quality of the products. A wider use of slate in such products could result only from a definite price advantage as compared with other fillers. While it is probable that waste slate may be placed on the market at prices which will encourage its wider use, it is evident that a waste slate utilization industry can never attain sufficient magnitude to definitely assist the slate producers unless it is demonstrated that some definite advantage in quality may be gained when slate is substituted for fillers now in use. The main purpose kept in view throughout the inquiry has been, therefore, to find advantageous uses for waste slate in order that both producer and consumer may be benefited.

Mode of Investigation

The Bureau of Mines has no facilities for conducting exhaustive tests of this character, and consequently the co-operation of a number of manufacturing companies was enlisted, for it was felt that tests made under actual working conditions would be of great practical value. Many companies kindly agreed to make such tests and submit the results to the bureau. Full returns have not yet been received, but a summary of all the information thus far gained is presented below.

Waste Slate as a Filler in Rubber

Most of the pulverized slate submitted for testing as a rubber filler was of such fineness that 80 per cent would pass through a 200-mesh screen. Samples varying in weight from 3 to 10 pounds were submitted to 27 companies. Several companies which obtained favorable results from the small samples and desired to make tests on a larger scale were provided with 100 to 200 pound samples.

Eighteen reports have been received from manufacturers of various classes of mechanical rubber goods. Of these reports seven were unfavorable and 11 were favorable. It was claimed by those reporting unfavorably that the resulting rubber was inferior in tensile strength, stretch and wearing quality. One manufacturer claimed that slate flour made the product dry and hard with a tendency to crack. Several reports were received to the effect that the slate submitted was insufficiently ground, and that finer grained filler would give better results. Only one manufacturer expressed a preference for coarse-grained filler.

Details of one of the tests are given below. Slate flour was tested as a filler in comparison with soapstone. A physical examination revealed that the slate flour was coarser and less uniform than the soapstone used. The ingredients of the two compounds are shown in the following table.

Composition of Rubber Samples for Testing Purposes

Ingredients	Sample No. 1	Sample No. 2
Smoked sheets	40.0%	40.0%
Magnesium oxide	2.0	2.0
Sulphur	3.5	3.5
Soapstone	54.5	.....
Slate flour	.....	54.5
Total	100.0	100.0

One-tenth inch slabs were press-cured for 75 minutes under 50-pound pressure. Stock containing the slate flour was very dark in color. The products were tested with the following results:

Results of Tests on Samples

Sample	Tensile Strength	Elongation
No. 1	1315 pounds	525%
No. 2	774 pounds	270%

These results indicate that slate flour is inferior to soapstone as a filler, though the coarseness of grain may have had some influence on the results obtained.

Eleven manufacturers of mechanical rubber goods found that slate flour was a satisfactory filler for such products as disks, sheet packings, molded shoe heels and soles, hard rubber battery jars, carriage tires, garden hose, clutch facings and similar products. Slate flour was used successfully as a substitute for whiting, clay, ground barytes and aluminum flake. A manufacturer of rubber footware found that products in which slate was used compared favorably with those made from regular compounds in tensile strength, elongation, and accelerated or natural ageing, but repeated stretching caused the rubber to break more readily than when regular compounds were employed. The chemist in charge of the tests concluded that this latter quality was due to the coarseness of the slate filler, and suggested that finer grinding would overcome the difficulty.

Detailed tests conducted by one manufacturer may be of interest. For comparative tests three rubbers were compounded, one containing 40 per cent whiting, a second 40 per cent clay, and a third 40 per cent slate flour. The results of tests made on the rubbers thus compounded are shown in the following table:

	Thickness	Elongation	Break lbs.	Tensile strength lbs.
Whiting as filler	136	9	58	850
Whiting as filler	136	8	46	680
Clay as filler	188	6½	80	850
Clay as filler	188	6½	80	850
Slate flour as filler	160	9¼	68	850
Slate flour as filler	140	9¼	56	800

The comment of the chemist who conducted the tests was that "slate flour shows up very well; if the price is low enough it can be used advantageously."

A manufacturer of mechanical rubber goods, tubing, friction and rubber tape found that slate flour could be substituted for cheap whiting in gray and black products. The whiting which it might replace is quoted in 1921 at $13 to $16 per ton.

A sample of slate pulverized to a fineness such that 95 per cent would pass

* Bowles, O., Slate dust in asphalt road surface mixtures. No. 2230, Reports of Investigations, March, 1921, Bureau of Mines; reprinted in Rock Products, May 7, 1921. p. 35.

through a 200-mesh screen and 90 per cent through a 300-mesh screen, was supplied to one rubber company. As a result of tests made on rubber compounded with this filler, the opinion was expressed that slate flour was not quite as good as high-grade clay, but gave better results than whiting or ground barytes.

The difference of opinion evident from the reports as given above, may therefore, be largely due to insufficient grinding of the slate flour submitted for testing purposes. At the time most of the tests were made the Bureau found it impossible to obtain slate flour which would analyze finer than 80 per cent through 200 mesh. The results of the tests, together with opinions expressed by several rubber chemists, indicate that if slate flour of much finer grade had been used the results would have been more uniformly favorable. This is corroborated by the result obtained from one sample of fine material, as noted in the preceding paragraph.

The weight of evidence points to the probability that finely pulverized slate is a satisfactory filler for mechanical rubber goods, and it is important to note that it could be placed on the market at a price considerably lower than that of ordinary fillers now in use.

A few manufacturers who made tests of slate flour as a filler in rubber such as is used in automobile tires report unanimously that slate flour is not as satisfactory as fillers now in use. It is felt, however, that the evidence is not to be regarded as conclusive until extremely fine-grained material has been tested.

Waste Slate as a Constituent of Linoleum, Oil Cloth and Window Shades

Oil cloth, linoleum, other floor coverings and window shades all contain a varying percentage of mineral fillers. In oil cloth the content of filler varies from 40 to 70 per cent, depending on the grade, and in linoleum it constitutes about 20 per cent of the total mass, with a larger proportion in the backing. English and domestic china clays are used in white oil cloth and white window shades, while colored fillers may be used in other products. Red slate flour and pulverized red shale are used as a backing in red linoleum, and as a constituent of felt base floor covering.

The ordinary mineral fillers used are clay, whiting, barytes, asbestine (a form of talc), ochre, limestone and slate flour. Products having colors other than white require as fillers any low-priced inert mineral product in pulverized form, 95 per cent to 100 per cent of which should pass a 100-mesh screen.

At the present time a considerable tonnage of red slate flour and pulverized red shale are used in the linoleum and other floor covering industries, but little slate flour of any other color has yet been employed.

One company found that slate flour was too gritty to be used successfully. No information has been obtained as to the fineness of the material tested, and it may be that fine grinding would overcome the gritty property. A manufacturer of shade cloth found that a sample of slate flour submitted by the Bureau of Mines was satisfactory as a filler. Its use would depend largely on the price as compared with that of pulverized limestone.

Another manufacturer of shade cloth found that slate flour was satisfactory, except that difficulty was encountered in mixing it with water as it had a tendency to "ball up." Experiments are now being conducted with the view to overcoming this difficulty by mixing with oil or by grinding in oil and water. Tests made on samples of oil cloth by one manufacturer indicate that slate satisfactorily replaces the china clay ordinarily used as a filler, but the same difficulty was experienced in mixing with water as noted in the preceding paragraph.

The great advantage in price of slate flour over china clay should encourage further experimentation directed toward overcoming the difficulties encountered in mixing the filler.

It seems probable, therefore, that oil cloth, floor covering and window shade materials, with the exception of those that are white in color, may be manufactured successfully using slate flour as a filler. Slate flour compares favorably in price with the cheaper grades of filler such as ground barytes, off-color talc, impure clay and pulverized limestone or marble. When substituted for china clay the advantage in price is much greater. It is evident, therefore, that a considerable saving could be effected by substituting slate flour for fillers now in use.

Waste Slate as a Filler in Plastic Roofing and Flooring

About 75 per cent of the volume of certain types of plastic flooring is made up of pulverized slate. The insoluble character of slate renders it of especial value for acid-proof plastic flooring and lining for acid tanks.

Roofing mastic is commonly made from a mixture of coal tar and slate flour. It is used to form the bed on which roofing tiles are placed, and to fill the joints between them. It is used in the same way with rectangles of slate on flat slate roofs. Both pulverized limestone and slate are used as fillers, and the choice of material depends chiefly on the price. Fillers used by some companies may be manufactured at low cost, as extreme fineness of grain is not required, material which averages 75 per cent through 100-mesh or even coarser being employed. Other manufacturers require material of such fineness that 75 to 85 per cent will pass a 200-mesh screen. The cost of manufacture will of course depend largely on the fineness desired.

Slate flour as a filler in plastic products has passed the experimental stage, for it proves to be well adapted for such purposes and is now used in large quantities. One company now employes about 50 carloads of slate a year in the manufacture of plastic products. An extension of its use depends almost entirely on the ability of grinding companies to place it on the market at prices that will compete with those asked for pulverized limestone and other low price fillers.

Summary

All of the information available indicates that waste slate may be used to advantage as a filler in mechanical rubber goods and in some classes of oil cloths, floor coverings and window shades. Apparently it is not adapted for use in rubbers of a grade used in automobile tires. For plastic roofing and flooring products containing coal tar it has long been in use and constitutes a very satisfactory filler. Several hundred carloads per year of waste slate are probably used for this purpose at the present time.

For some products, particularly for rubber, a much finer grained slate flour than any now on the market is demanded. One of the most promising ways in which manufacturers of pulverized slate can promote a wider use of slate flour is by producing a uniform reliable product at least 95 per cent of which will pass a 300-mesh screen, and by introducing such a product among manufacturers of mechanical rubber goods, linoleum, oil cloth, phonograph records and other products requiring fine grained filler.—U. S. Bureau of Mines, Reports of Investigations.

Growing Markets for Montana Rock Phosphate

"THE PUYALLUP VALLEY, Washington, promises to become a generous purchaser of rock phosphate," said Mrs. Virginia MacCraig, assistant secretary of the Montana Phosphate Co., on her return from a recent trip to Seattle, according to a local newspaper report. "W. H. Paulhamus said he had used rock phosphate there with good results, and M. E. McCallum, soil expert at the experimental station at Puyallup, said phosphate was the one thing that would save the soil of the northwest.

"Mr. McCallum said the farmers were forcing their land and would be compelled to resort to soil building as in Illinois, where lime and phosphate were used. For restoring their soil some of the farmers were paying as much as $128 a ton for a commercial fertilizer, as compared with $11 to $13, which will probably be our charge in Puyallup."

More Construction the Key to Unemployment Problem

Report of the Committee on Construction Industries of the President's Conference on Unemployment Endorsed by Secretary of Commerce Hoover

DURING THE WORLD WAR, private construction and construction of every nature not contributing to war purposes was prohibited. After the signing of the armistice high costs prevented the resumption of genuine construction activities. The investing public in this field has not had confidence in the stability of values; they have not been able to determine if and when the cost of construction reached a point warranting their investment. *A return of confidence in values in construction* will assure *more employment* than in any other area. Considering all branches of the construction industry, more than 2,000,000 people could be employed if construction would be resumed.

To Secure Confidence

There are three outstanding factors in the building and construction situation, which have the greatest bearing on the resumption of construction activities. They are *financing, material costs* and *labor costs.*

These factors present questions which cannot be settled in a national way; they must be investigated by those interested, in each community for itself. The questions are:

(a) Can the prospective investor finance the operation at a reasonable cost?

(b) Does the cost of construction materials to the prospective investor, properly represent the reduction which has been made in the wholesale prices?

(c) Is labor in the particular locality working at fair rates and giving fair value in the quantity and quality of work done?

If local conditions prove satisfactory, there is no reason why work should not proceed immediately.

Financing

Money must be made available on reasonable terms and in reasonable volume and free from demands for bonuses and commissions of a questionable character.

In every section of the country owners have declined to start new projects on account of the financing charges, both the interest rate and the commissions and premiums paid for floating loans being discouragingly high. Commissions and premiums varying between 10 and 20 per cent have been charged in addition to from 7 to 8 per cent interest. For example, before the first work of construction was begun the owners of an apartment house were required to pay for the million and a quarter involved, an interest rate of 7 per cent, and a bond premium of 1½ per cent, and a floating charge of 10 per cent, making a total financing charge of 18½ per cent. The financing charge of a subsequent loan of $250,000 for the same structure was $75,000. This is a charge of 30 per cent. It is doubtful whether the margins received by the architect, the contractor, and by all the producers in the basic industries involved aggregated a sum equivalent to these financing charges.

When an owner must pay such a sum before construction work even starts, many projects have necessarily been abandoned in the face of a continual need and demand for building.

While excessive financing charges for building have not been exceptional, many savings banks, trust companies and insurance companies have maintained a conservative loaning policy with regard to real estate and home building and the building and loan associations of the United States with their two and a half billion dollars of assets have been conducted with exceptional efficiency. Underlying the whole matter of the financing of construction there is, however, the sound banking principle that long-term deposits and the savings accounts of the people, should primarily be used for long-term purposes and should not be intermingled with speculative and commercial business.

Material Prices

Many construction materials have been substantially reduced in price. Some may have been reduced to a point which is retarding production. It is apparent, however, that other construction materials have not yet been reduced in keeping with the trend of wholesale prices on other commodities. Manufacturers of such materials should be urged to promptly make their readjustments to a reasonable basis. They must realize that failure on their part to do so is not only limiting their own business but it is also interfering with the production and sale of other construction materials; it is interfering with greater employment; in a word, it is a contributing factor to holding back the progress of the entire industry.

In many instances retailers of construction materials have not yet followed the reduction of manufacturers and wholesalers in their resale prices. This is an important subject to be taken up locally in each community. The retailers must be shown the necessity of bringing their prices to local buyers down to a point consistent with the reductions made in wholesale prices after taking into consideration increases in freight rates or legitimate increases in cost which exist in other directions.

Labor—Wages

This cannot be regulated by national action. The cost of living, rentals, and working conditions differ in various communities. Where fair wage adjustments have not been made, construction is held up. Such conditions should be dealt with fairly and frankly between employer and workmen and reasonable readjustments promptly made.

Approaching this subject, we believe that the employer should not permit the wage of his workmen to go below that point at which it not only provides sufficient to take care of the necessities of life but also enough to enable the family to educate the children properly; to provide reasonable comforts and conveniences and to permit systematic savings even though small. In the comparison of wages for building artisans with those of other industries, due allowance should be made for seasonal unemployment.

The workman, on the other hand, should deliver maximum production with proper interest in the welfare of the business out of which his wages are paid, and should eliminate restrictions and measures which tend to interfere with his production or with the production of others. Stoppage of work from jurisdictional controversies in the construction industry should be permanently abandoned as measures detrimental to the public welfare.

As a factor contributing to the necessarily high costs in some localities, is the continuation of—

Unfair Practices

Notwithstanding the improvements which have taken place in some instances, with respect to the practices in the industry, it is apparent that there still exist trade

abuses, waste and unnecessary expense. It is a first essential of the proper development of the construction industry on a sound basis that all practices which unnecessarily retard the work or add to its cost should be immediately discountenanced and abandoned, if the confidence of the public is to be fully restored.

Reduction of Freight Rates

This group recognizing that transportation problems are not within its peculiar province desires, nevertheless, to express the conviction that every reasonable step should be taken, necessary to enable the railroads to resume their customary activities, and to re-establish efficiency, economy and regularity in transportation service.

Readjustments of, and reductions in, freight rates on construction materials are essential to a sustained revival of building activity. Increases in rates on construction materials imposed during the war left the construction industry under a relatively heavier handicap of increased transportation costs than had been imposed on most other commodities.

To this war-time increase in freight rates has since been added an increase of 25 to 40 per cent, thus perpetuating and even magnifying the effect of the war-time policy of restricting general construction activity.

The construction industry cannot effectively function under a freight rate fabric artificially distorted by the continuation of restrictive war measures. A great economic waste would be incurred if, because of failure to reduce and readjust freight rates existing plants for the production of construction materials had to be abandoned and a new alignment of producing facilities established in accordance with the present rates, a fabric originally designed, in the public interest, to discourage the very thing which, in the public interest, the Government now desires to encourage; that is, the normal operation of industry. The financial burden of such a readjustment of plants would have to rest ultimately upon the public; and its necessary effect would be to curtail existing competition and to limit the radius of distribution of many of the construction materials.

In addition to such readjustment of freight rates on construction materials as will permit construction activity, freed from unnecessary artificial restriction; it is urged that such inequalities as may after such general readjustment, exist in the rates on various construction materials be investigated and removed by the Interstate Commerce Commission. We suggest the consideration of the practicability of encouraging during winter months the transportation of materials used in road and other construction work, thus utilizing transportation equipment which might otherwise remain idle.

Revision of Building Codes

The development of the art of building through the adoption of new and economical scientific methods of construction is retarded throughout the country by the building codes of the various municipalities, which differ flagrantly as to floor loads, wall thicknesses, and other elementary requirements which should be comparatively uniform, climatic conditions excepted. It is the opinion of competent authorities that as much as 20 per cent would be saved in certain cities by the adoption of building codes based upon modern scientific knowledge. The codes of nearly forty of the cities and municipalities are now in the process of revision. The Secretary of Commerce has appointed a committee of recognized experts to study the principles upon which the building codes may be standardized, which committee is co-operating with the building officials in the various municipalities. A material saving in the yearly expense of city building may be hoped for through investigation and co-operation along these lines.

OF two to four million people of this country now out of employment between 10 and 20 per cent ARE ACTUALLY IN WANT OR IN DANGER OF STARVATION. Yet we have over 40 per cent of all the GOLD in the world. Are we going to allow these conditions to go from bad to worse?

Statistics

There is a definite need for statistics properly co-ordinated, accurately prepared, and furnished promptly—affecting production, capacity and distribution of basic materials in the construction industry. The present confusion and limited information through handling by several departments is causing unnecessary expense to the Government without giving complete data and service to the public. Arrangements should be made as promptly as possible, so that such statistics can be furnished by the proper department.

Recommendations

It is recognized that the construction industry is a key industry, that there is a vast amount of construction needed and that this construction work would afford employment to a large number of men directly and indirectly, and would result in the creation of permanent and useful wealth, translating wasting labor into earning capital.

To meet the present unemployment emergency and to make renewed activities in the construction field possible does not require special concessions to the industry. But it does require a complete and prompt removal of unnecessary handicaps, restrictions and limitations, both direct and indirect, these including credit, freight rates, priorities, undue costs in relation to labor and materials, wasteful building codes, and the like.

In the resolutions adopted at the conference on Friday, September 30, 1921, the Governors of the several States were requested to summon representative committees with the co-operation of the Mayors or otherwise, to—

(a) Determine facts.

(b) Organize community action to secure adjustments in costs, including removal of freight discriminations, and clean-out campaigns against combinations, restrictions of effort and unsound practices where they exist—to the end that building may be resumed.

It is recognized that this request of the Governors must be followed up by suggestions of a practical, workable nature, which will enable the administrative officer in each State to carry out the suggestion promptly and in the most satisfactory manner. It is recognized, also, that to secure the elimination of restrictions and limitations which have been placed on the industry, as previously referred to, that intelligent and sustained effort must be put into the situation.

It is therefore recommended that Secretary Hoover, in continuation of the policy of the creation of local organizations inaugurated by the Department of Commerce, the National Federation of Construction Industries, the U. S. Chamber of Commerce, etc., appoint a committee selected from the various elements interested in construction, such as financiers, labor, engineers, architects, contractors, material manufacturers and others to be known as the Committee on Construction Development, which will be charged with the responsibility of preparing and making effective plans for—

(a) Co-operation with the Governors and Mayors in the several States in carrying on community conferences on construction, to the end that local restrictions may be eliminated, abuses done away with, and proper local attention given to the efficient planning and development of construction work, as it is only through such community conferences that the local situation can be properly appraised.

(b) The prompt removal of unnecessary or inequitable limitations and restrictions which have retarded real construction activity.

Such committee to use agencies and to adopt such plans for conducting its work as may seem to it best, in co-operation with the Secretary of Commerce. The work of such local committees as have already been organized in the country have had a profound value in readjusting the construction situation and the time is ripe for their more definite and extensive organization.

Editorial Comment

Coincident with the announcement of the proposed railway strike comes the breaking up of the President's Conference on Unemployment, the only specific recommendations of which were that building work be at once revived. The officers of the Association General Contractors of America at once planned to act on this suggestion and have prepared for meetings of local committees to push the issue. Joint conferences of architects, engineers, contractors, material producers, building trades labor councils are being held, which may now be turned into powerful instruments to force an early end to the railway strike, if it should materialize.

To Revive Prosperity

These meetings, or conferences, under the auspices of the Associated General Contractors have been, are being, and will be held as follows:

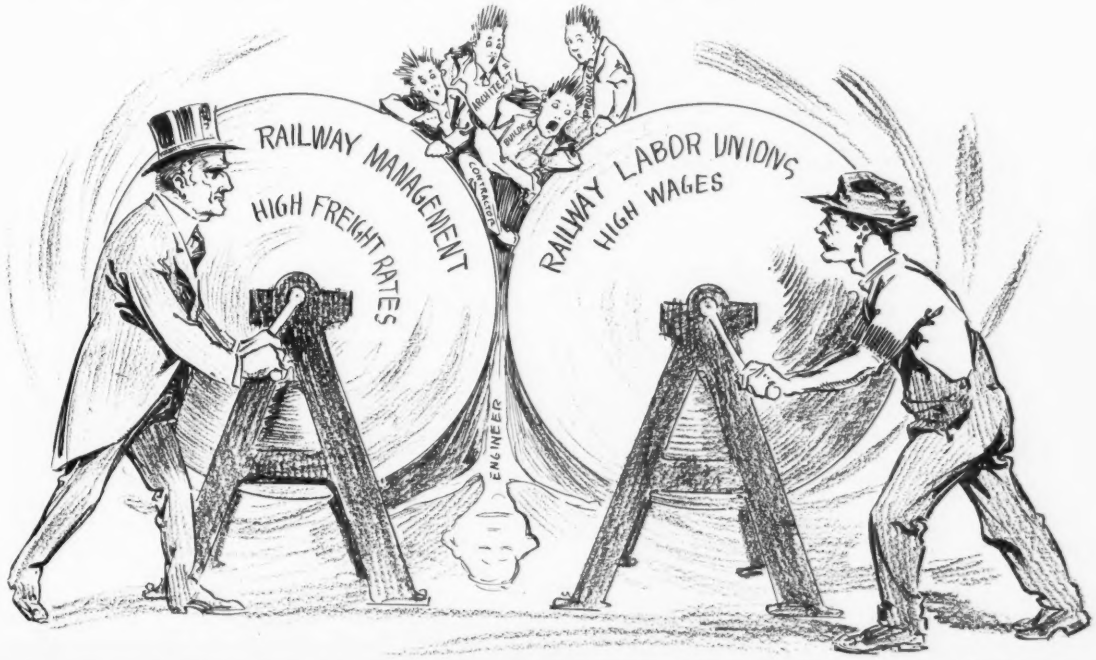
Minneapolis, Minn.—Monday, October 17.
Des Moines, Iowa—Wednesday, October 19.
Omaha, Nebr.—Thursday, October 20.
Denver, Colo.—Friday, October 21.
Salt Lake City, Utah—Monday, October 24.
Spokane, Wash.—Thursday, October 27.
Seattle, Wash.—Monday, October 31.
Portland, Ore.—Tuesday, November 1.
San Francisco—Friday, November 4.
Los Angeles—Monday, November 7.
El Paso, Tex.—Thursday, November 10.
Dallas, Tex.—Friday, November 11.
Oklahoma City—Monday, November 14.
Kansas City—Tuesday, November 15.
St. Louis, Mo.—Wednesday, November 16.

It should go without saying that every reader of Rock Products ought to get behind this movement and exert every effort individually and collectively to emphasize the necessity for a quick revival of construction work.

It is to be hoped for the good of other industries, and particularly the construction industry which is sure to be the hardest hit, that there will be no railway strike. Nevertheless the issues involved call for a real "show down," and it is believed that not a few building material producers are willing to sacrifice all that temporary stoppage of construction work means to see the issues squarely faced, so that the new construction season may start with a clean slate.

Railway Strikes

Reduced freight rates on building and construction materials, agricultural lime and limestone, and similar gross bulky commodities are an absolute necessity unless the railways are prepared to permanently lose much of this traffic. Probably any radical reduction in rates on commodities, which under normal conditions constitute at least a third of the railway tonnage, can not come without a corresponding reduction in railway wages. All the same the railway managements have somewhat befogged the issue in their play for public sympathy. Rate reductions on many commodities, and these include nearly all rock products, are a necessary business move, for retention of that traffic, wage cuts or no wage cuts.

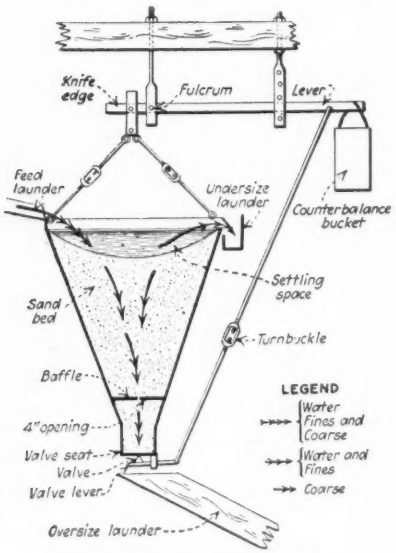


Reducing Freight Rates and Railway Wages as It Looks to Construction Industry

New Machinery and Equipment

Boylan Hydraulic Classifier

INCREASING POPULARITY for the Boylan cone classifier is being recorded in the Joplin-Miami zinc and lead district, and an increasing number of mining companies are installing them, according to the Ore Reclamation Co., of Joplin. This classifier is used in place of trommels, overshot, impact and other mechanical screens, free- or hindered-setting classifiers, common hydraulic classifiers, dewatering boxes, and similar devices, and also instead of mechanical and hydraulic classifiers. It operates on the principle of the free-settling hydraulic classifier. The volume of replacement or the speed of flow in the machine is maintained almost constant by the automatic opening and closing of the oversize valve, governed by the amount of solids in the cone. The diagram should be self-explanatory.



Boylan Hydraulic Classifier

Screen Tests of Feed and Product of Boylan Cone Working on Rougher Jig Tailings

		—Feed—		—Oversize—		—Undersize—	
	Mesh, Tyler Standard	Per Cent Weights	Cumulative Per Cent Weights	Per Cent Weights	Cumulative Per Cent Weights	Per Cent Weights	Cumulative Per Cent Weights
+	4	22.47	22.47	26.51	26.51	.....	.....
	8	30.45	52.92	33.72	60.23	.....	.....
	10	.....	.....	.....	.....	0.05	0.05
	20	24.15	77.07	27.86	88.09	0.67	0.72
	35	8.19	85.26	8.28	96.37	4.96	5.68
	65	.....	.....	.....	.....	14.66	20.34
	100	6.04	91.30	2.79	99.16	20.36	40.70
	200	3.55	94.85	0.40	99.56	37.00	77.70
—	200	5.15	100.00	0.44	100.00	22.30	100.00
	Totals	100.00	.....	100.00	.....	100.00	.....

The original cost of the machine is from $300 to $400. It uses no power or lubrication. The sides of the cone are protected from wear by a lining of stationary or slowly moving sand, and the wear is confined to the plate valve seat, the conical valve and the valve lever. The cost of maintenance on one cone through which 55,000 tons have been run was 45 cents for one conical valve. As against this it is pointed out that screen jackets cost approximately $50, and their life is little more than 10,000 tons.

The average efficiency of the cone on seven screen tests taken on different cones was 83.3 per cent. The average assay of the tailings after desliming was 0.93 per cent lower than before desliming.

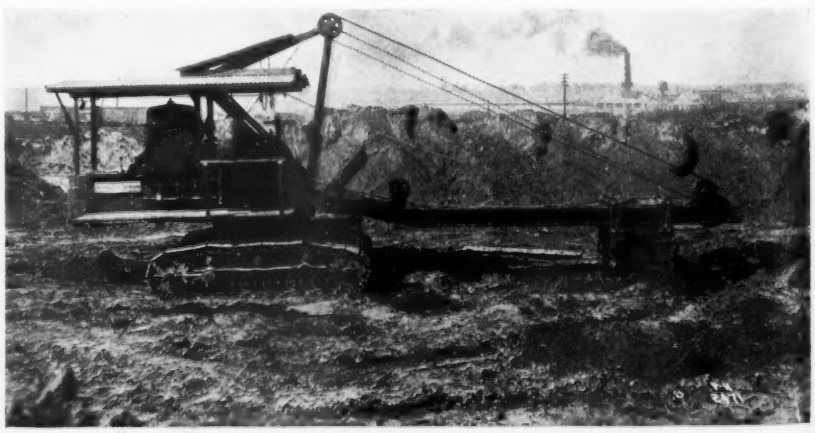
Some of the companies that have installed these cones in this district are the Muncie, Anna Beaver, Premier, Standard, McBee, Chanute Spelter and Farmington. The cone was patented on Jan. 6, 1920, by S. H. Boylan, the inventor, a mining engineer living at Joplin, and is sold by the Ore Reclamation Co., Joplin, Mo.

Skimmer Scoop Attachment

THE SKIMMER SCOOP has been designed for tearing up old roads, grading new roads, and for other types of shallow excavation. It is built by the Pawling & Harnischfeger Co., of Milwaukee, for attachment to either its No. 205 or No. 206 excavator crane. This attachment should have a wide application in quarries and gravel pits where stripping of overburden is necessary. Where the overburden exceeds a depth of 3 ft., the P & H shovel attachment is recommended. This is interchangeable with the skimmer boom and applicable to the same machine.

The scoop loads by being run out from the machine. When the bucket is filled the boom is raised, swung over the wagon and the load released. The under side of the bucket is hinged at the forward end and is released, for dumping, by a line from the cab.

The boom is interchangeable with the standard boom for this type of crane, and the new device can be installed within a few hours. The shovel attachment, brought out by the company earlier in the year, is likewise interchangeable, so that at relatively small additional investment the operator may have a steam shovel, a skimmer scoop, or a standard crane, the latter with all of the flexibility of that type of equipment.



Excavator equipped with skimmer scoop

Scoop Body for Ford Trucks

THE EASTON Car and Construction Co., 50 Church Street, New York City, has recently placed on the market a simple all-steel self-dumping body specially designed for Ford trucks. The following is a description of the body reprinted from a bulletin issued by the company:

It is furnished as a complete unit and can be attached or detached by means of four simple U-bolts, in ten minutes.

It can be used by road builders, quarries, coal yards, industrial plants, sand banks, gravel pits, clay banks, etc., everywhere. Like the Ford, it can be used for handling all sorts of materials in all kinds of places, under all conditions.

The Easton Scoop Body is specially adapted to hand loading. It dumps itself when the latch is tripped, rights easily, and locks itself automatically. The dumping and righting can all be done by the driver without leaving his seat.

The scoop with its depressed lip affords a very low hand loading height, which makes it adaptable to many uses besides those involving overhead bin loading. When overhead hopper loading is used,

1. Scoop truck in quarry

3. Scoop truck used for hauling crushed stone

the extremely low over-all height of the body, due to the hinge dump and low sides, cuts down on the cost and height of the hoppers. Then, too, the load is lower on the car, which insures greater stability at speed. The position of the body on the chassis is where Ford intended the load should be carried.

2. Scoop truck at crusher

This body is self- or gravity-dumping in operation. The driver merely reaches back from his seat and trips the latch. It is very easily righted and this can be done by a man on the ground or by the driver from his seat, by means of a handle or a line attached to the body. The body is merely slammed back and is locked automatically by the husky spring latch. The whole operation is a matter of seconds only.

The angle of dump is amply steep for an absolutely clean discharge and may be adjusted to suit by shortening or lengthening the check chains.

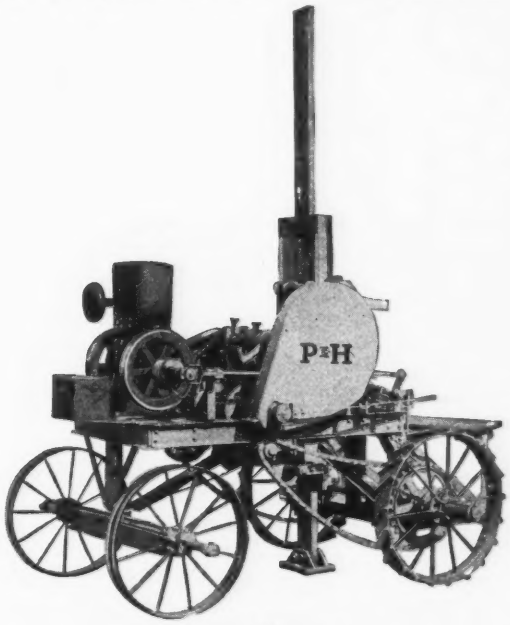
The discharge is clean and clear of everything, depositing the load where it is wanted. The final shock of the dump, which clears the body, is sufficiently cushioned by the spring in the check chain to prevent damage to chassis or body.

The body itself is made of ⅛-inch steel plate throughout, with smooth rolled and welded steel reinforcing flanges around the top. The bottom also is heavily reinforced by angles. The whole device is stiff, strong and rigid throughout, and will last for years.

The sub-frame is made of channels securely framed together. There is room between it and the driver's seat on the chassis for an auxiliary body or box.

New Power Tamper

THE accompanying illustration shows the latest model P. & H. power traction tamper made by the Pawling & Harnischfeger Co. of Milwaukee, this new type having a number of improvements over the previous model. All chains and gears are supplied with enclosing guards, the tamper and steering cables used are ⅜ in. diameter instead of ¼ in., new type traction wheels are furnished, with extension axles to allow for changing the tread from 58 in. to 76. The standard tamping head is 150 pounds in weight as before. Other refinements are embodied in the design, which makes it an improved machine, the company claims, for speeding up the work of tamping all kinds of ditches and trenches. Only one man is required to operate it—control of the power ram and the forward or backward movement of the tamper being readily accomplished from the operator's seat.



Power Tamper

The company has also just issued Bulletin 56X, dealing with excavating equipment. This booklet summarizes the achievements of the P. & H. line in road building, irrigation and reclamation, trench and general excavation and in all phases of engineering activity in which earth handling is necessarily the factor of greatest importance.

Bulletin 56X contains records and illustrations of the actual performance of P. & H. excavators under widely divergent conditions of service and application, and in the varying climate and topography of different sections of the country. This book is, in fact, a compilation of facts and figures from the field to demonstrate the performance of P. & H. equipment as recorded by its owners. The booklet is now ready for distribution to interested parties.

Large Portland Cement Output in September

THE MOVEMENT of portland cement continued on a large scale throughout September, more than 11,300,000 barrels having been shipped from mills. Shipments of portland cement during the third quarter of the year were approximately 33,970,000 barrels, establishing a record for this quarter. For the nine months ending September 30, 1921, the shipments amounted to 74,045,000 barrels, which exceeds the former record volume moved in the corresponding period of 1920.

Favorable operating conditions are indicated by the large September production of 10,027,000 barrels of finished cement, which established a record for that month. The average daily production was greater than that of August, and had there been as many days in September as in August the September production would have shown the larger total. Production for the third quarter likewise established a record, and for the nine months ending September 30 the production was about 99.8 per cent of the record quantity made during that period last year.

Stocks of cement at the mills were drawn upon to supply demand during September, as is customary in the season of active demand. At the end of the month stocks of finished cement at mills were approximately 6,953,000 barrels, compared with 8,280,000 barrels at the beginning of the month. This is about 135,000 barrels below the average for the month of September, 1917-1921.

The production of clinker, or unground cement, in September was approximately 9,329,000 barrels, which was a record for September and for the first nine months of 1921. Stocks of clinker at the mills amounted to about 3,200,000 barrels at the end of September.

The Bureau of Foreign and Domestic Commerce, Department of Commerce, reports that imports of hydraulic cement in August amounted to 10,988 barrels, valued at $32,315; the total for the first eight months of 1921 was 60,252 barrels, valued at $216,892. The exports of hydraulic cement in August were 84,538 barrels, valued at $295,183; the total exports for the eight-month period were 848,971 barrels, valued at $3,253,463. The exports are not keeping pace with those of 1920, in which there were nearly 3,000,000 barrels exported during the year.

Census Bureau's Summary Concerning the Quarrying Industries

WASHINGTON, D. C.—The following statement of results of the 1920 Census of Mines and Quarries, covering the calendar year 1919, is a summary by totals of the principal statistics compiled for limestone, granite, sandstone, basalt or trap-rock, slate, and marble quarrying enterprises in the United States. Stone of one or more of these varieties was reported for 1919 from every state except North Dakota. The statistics here presented are exclusive of figures for Alaska, Hawaii and Porto Rico.

The tables present data on the number of quarries, quarry lands operated, persons engaged, power used, capital invested, and the principal items of expense of operation of these quarries. The value of products shown is the amount received by quarry operators for stone as disposed of by them, and does not report the full value of such finished stone products as are reported by the Census of Manufactures. This value does, however, include receipts for by-products, and miscellaneous work or services furnished to other enterprises.

For this summary, the reports on the quarrying industries have been classified and separately compiled according to six principal kinds of stone produced. The classifications limestone, granite, sandstone, and basalt or traprock include statistics relating to the production of miscellaneous unclassified stone. These have been distributed to the specified classes to which they are most nearly allied.

The figures on quantities in the following table are derived from data compiled in co-operation with the Census Bureau, by the United States Geological Survey. The figures for sandstone include a large amount quarried for use as sand or silica, which is not reported as sandstone by the Geological Survey.

Lime Used for Preserving Eggs

TESTS WHICH INVOLVE the use of water glass and limewater for the preservation of eggs for home use have been carried on by the United States Department of Agriculture. They show that either water glass or limewater will preserve eggs successfully, and that while water glass is usually easiest to use and ordinarily gives better results, limewater is a much cheaper preservative. It was found that limewater without salt gave slightly better results as a preservative than where salt was used. Air-slaked lime did not give as satisfactory results as where lump lime was tested. Galvanized receptacles were used successfully for limewater tests; the pails were thoroughly coated with melted paraffin previous to their use with the solution. Tests in which eggs were wrapped in tinfoil and wax paper and kept in an open cellar or room were not at all satisfactory. Although the tinfoil reduced evaporation to a negligible quantity, the eggs developed extreme mustiness within a short time.

Census of Mines and Quarries, 1919. Principal Statistics, for Producing Enterprises, Quarry Industries

	Total	Limestone	Granite	Sandstone	Basalt or Trap Rock	Slate	Marble
Number of enterprises	1,820	895	358	255	163	101	48
Number of quarries	1,922	925	381	276	174	104	62
Number of enterprises operating dressing mills or grinding plants in connection with quarries	354	44	152	66	6	61	25
Quarry lands operated total (acres)	252,242	122,820	30,659	48,729	15,625	5,440	28,969
Persons engaged in industry, total	48,087	24,705	8,951	4,897	3,791	3,852	1,891
Proprietors and firm members, total	1,288	633	328	179	77	64	7
Number performing manual labor	417	175	145	53	20	21	3
Salaried employees	3,813	2,003	574	431	378	275	152
Wage earners, average number	42,986	22,069	8,049	4,287	3,336	3,513	1,732
Power used (horsepower)	376,808	213,717	55,674	33,869	37,307	20,613	15,628
Capital	$148,759,533	$82,124,367	$18,823,980	$18,955,321	$12,899,171	$6,923,172	$9,033,522
Principal expenses:							
Salaries	$7,168,303	$3,726,593	$1,196,456	$830,633	$751,247	$409,255	$254,119
Wages	$45,534,798	$23,926,332	$8,587,659	$4,448,811	$3,991,307	$3,128,249	$1,452,440
Contract work	$995,976	$665,557	$118,637	$54,161	$41,406	$95,663	$20,582
Supplies and materials	$18,441,459	$10,968,220	$2,593,040	$1,664,432	$2,030,869	$632,459	$552,439
Fuel	$9,596,214	$2,897,432	$833,636	$597,353	$562,827	$228,954	$147,644
Power	$2,213,459	$1,278,958	$261,185	$250,909	$157,161	$188,505	$76,741
Royalties and rents	$1,381,290	$667,751	$139,202	$131,970	$250,199	$157,788	$34,380
Taxes	$2,088,160	$1,119,861	$377,646	$195,309	$198,613	$73,238	$123,491
Expenditures for development (included in the above items)	$1,241,343	$764,673	$156,870	$96,555	$131,800	$60,531	$30,914
Value of products	$101,684,919	$52,943,924	$18,279,345	$10,684,969	$9,657,977	$5,720,792	$4,397,912
Approximate quantity of stone produced (tons, 2000 lbs.)	67,844,000	49,715,000	4,420,000	5,224,000	7,745,000	409,000	331,000

Accident Prevention

Transmission Shafting

Prepared by the Engineering Department of the National Safety Council

MANY ENGINEERS advocate that all projecting shaft ends, regardless of location, be cut off or equipped with stationary protective casings, if accidental contact is not prevented by the shaft guards.

The state of New Jersey makes this a mandatory rule. Pennsylvania requires that shaft ends within 6 ft. of the floor of platform shall be guarded. Massachusetts places the distance at 7 ft. and limits the rule to shafts projecting more than 2 in. from bearings.

The council believes that the best practice is to cut off, or guard as above, all projecting shaft ends where there is a possibility of clothing or material catching on them, if the projection is 1 in. or more or if there is an unfilled keyway in the end of the shaft.

Couplings and Collars, Keys and Set Screws

Shaft couplings and set collars should be of a safety type, without projecting belts, set screws or other dangerous projections or be suitably guarded.

Clamp couplings should be guarded by a cylindrical sleeve the full length of the coupling.

Jaw clutch couplings should be provided with a cylindrical sleeve which at least covers the jaws.

Universal and flexible couplings should be so guarded or encased as to remove all hazards.

Friction clutch couplings should have their operating mechanisms, where exposed, completely guarded.

Keys exposed to contact should be made flush or guarded.

Keyseats in ends of shafts, where exposed to contact, should be filled or guarded.

Set screws on revolving parts, where exposed to contact, should be countersunk or covered by a guard, or a headless set screw should be used. No part of the set screws should project above the surface.

The above guards should be so designed, where practicable, as not to revolve with the part guarded.

Bearings

Accurate alignment of bearings is an important factor in safety and in economy of operation. Frequent inspections of bearings and hangers are desirable. *They should be so equipped with oiling apparatus that there will be no occasion for the oiler to come into dangerous proximity with shafting when it is in motion.*

Pulleys

Pulleys should be spaced at a slightly greater distance from bearings or hangers or other pulleys (except tight and loose pulleys) than the width of the belt, so that in case the belt slips off the pulley it will not become wedged between the hanger and the pulley, or between the pulleys, thus pulling down the line shafting. If it is impracticable to space pulleys further from a hanger or another pulley than the width of the belt, the intervening space should be guarded in such a way that it will be impossible for the belting to become wedged should it slip the pulley. This may be done by placing a spool 4 in. larger in diameter than the pulley on the side of the pulley adjacent to a hanger or another pulley or by the use of a bolt hanger.

The states of Pennsylvania and New Jersey provide that when bearings are not self-oiling and the clearance between the pulley and the bearing on line shaft is 36 in. or less, the pulley shall be completely guarded on the side nearest the bearing and all keyways in the shaft between such pulley and bearing shall be substantially encased or properly filled. A very simple and effective guard may be formed by binding and lapping a steel plate.

Pulleys should be a little wider than the width of the belt.

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National Safety Council

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168 North Michigan Avenue, Chicago, Ill.

Pulleys should be frequently inspected for cracks which are likely to develop in the arms and rims. When a crack occurs a piece of the rim may be thrown out by centrifugal force and cause a serious accident. Testing by hammer will usually disclose any defects.

Idler pulleys or tighteners used to tighten belts on pulleys, if provided with counter weights, should have counter weights guarded or enclosed.

Transmission Gearing

In this term is included all forms of spur wheels, pinions, bevel wheels, mortice wheels, helical, skew and worm gears, rack and pinions, sproket wheels for chain drives, etc. Such gearing wherever located should be strongly and completely encased, or when this is impracticable should have a band guard provided with side flanges extending inward beyond the root of the teeth. Where there is a spoke hazard the gears always should be enclosed on exposed side.

Construction of Guards

Metal is preferable to wood in the construction of guards. Wooden guards, especially if oil soaked, increase the fire hazard; they also are more expensive in upkeep. Metal guards are practically indestructible, wear better and are more substantial. Where guards are subjected to acid fumes, wooden guards may be necessary, however.

All guards should be of rigid and substantial construction. The railing guards placed from 15 to 20 in. from the moving parts should be of the double type with the top rail 3 ft. 6 in. from the floor and an intermediate rail midway between the top rail and the floor.

If constructed of rolled shapes their section should be at least equal to that of 1½x1½x3/16 in. angle iron. Where the railings will be subjected to considerable handling or stresses it will be well to make them of 2x2x2¼ in. angle iron or its equivalent. If constructed of pipe, it should be not less than 1¼ in. inside diameter. If constructed of wood, the posts should be not less than 2x4 in., or its equivalent section, and the rails not less than ⅞x6 in., or its equivalent section. Uprights in all instances should be spaced not more than 8 ft. centers. Preference is given to railings constructed of rolled shapes, as they are less likely to fall; the use of wood should be avoided where practicable.

(To be continued)

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.			1.30 per net ton, all sizes			
Burlington, Vt.	1.00	.....	2.50	2.00	2.00	.....
Chaumont, N. Y.	1.00	1.75	1.50	1.50	1.50	1.25
Coldwater, N. Y.			1.50 per net ton, all sizes			
Eastern New York	.75	1.60	1.60	1.60	1.60	1.50
Eastern Penna.	1.00	1.75	1.75	1.50	1.50	1.50
Munns, N. Y.	1.00	1.50	1.50	1.25	1.25	1.25
Walford, Pa.	1.00	.....	1.60	1.60	1.60	1.60
Western New York	.70	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alden, Ia.	.80@1.00	.80@1.00	1.50	1.45	.....	.....
Alton, Ill.	2.00	.....	1.50	1.40	1.35	.....
Bettendorf, Ia.			All sizes, 2.00 cu. yd. f.o.b. quarry			
Buffalo, Iowa	1.00	1.30	1.40	1.20	1.25	1.30
Chicago, Ill.	1.00	1.40	1.00	1.00	1.00	1.00
Dundas, Ont.	1.00	1.50	1.50	1.50	1.25	1.20
Eden and Knowles, Wis.	1.30	1.30	1.30	1.30	1.30	.....
Faribault, Minn.	.....	.....	.....	.....	2.00	.....
Greencastle, Ind.	1.25@1.35	1.25	1.10	1.10	1.10	1.10
Illinois, Southern	1.75	1.60	1.50	1.50	1.40	.....
Kokomo, Ind.	1.10	1.25	1.25	1.10	1.10	1.10
Krause or Columbia, Ill.	1.50	1.20	1.25	1.20	1.20	1.20
Lannon, Wis.	.90	1.00	1.00	1.00	1.00	1.00
Marblehead and Brillion, Wis.	1.10	.....	1.20	1.10	1.10	.....
Montrose, Ia.	1.35@1.50	1.50	1.50@1.60	1.50	1.50	1.50
Oshkosh, Wis.			1.40 per ton, all sizes			
Sheboygan, Wis.	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10
Southern Illinois	1.50	1.40	1.40	1.40	1.35	.....
Stolle, Ill. (I. C. R. R.)	1.75	1.60	1.60	1.50	1.50	1.50
Stone City, Iowa	.50	.....	1.40	1.35	1.30	.....
Toledo, Ohio	1.84	1.99	1.99	1.99	1.84	1.84
Toronto, Canada	1.90	2.40	2.40	2.15	2.15	2.10@2.15
Valmeyer, Ill.	1.60	1.30	1.30	1.30	1.30	1.30
SOUTHERN:			These prices include 90c freight			
Cartersville, Ga.	.....	2.00	.....	1.25	1.25	.....
Chickamauga, Tenn.	1.10	1.00	.....	1.00	.93	.....
Dallas, Texas	1.10	1.25	1.25	1.25	1.25	1.10
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	.....
Fort Springs, W. Va.	1.35	1.65	2.00	1.60	1.50	1.45
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Ladds, Ga.	1.25	.....	.....	1.25	1.25	1.25
Morris Spur (near Dallas) Tex.	1.10	1.25	1.25	1.25	1.25	1.25
Portland, Ga.	.60@1.00		(All other sizes 1.00@1.25)			
Shephard, Tenn.	1.00@1.25	1.00@1.25	1.00@1.25	.75@1.00	.75@1.00	.....
WESTERN:						
Atchison, Kans.	.50	2.10 (Rip-rap.	2.10	2.10 1.80 per ton)	2.10	2.10
Blue Springs and Wymore, Neb.	.20	1.65	1.65	1.55@1.60	1.45@1.50	1.40
Bromide, Okla.	.60	1.50	1.50	1.50	1.30	1.30
Cape Girardeau, Mo.	1.50	.....	1.50	1.50	1.25	.....
Kansas City, Mo.	1.00	2.00	2.00	2.00	2.00	2.00

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Baltimore, Md.	1.25	2.50	2.35	2.25	2.00@2.25	2.00
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	.....
Branford, Conn.	.60	1.50	1.25	1.15	1.10	.....
Bound Brook, N. J.	2.00	2.20	2.00	1.70	1.60	.....
Dresser Jct., Wis.	1.00	2.25	2.25	2.00	1.75	1.75
Duluth, Minn.	.90@1.00	2.25	1.90@2.00	1.50	1.30@1.50	.....
Dwight Station, Calif.			.75@1.00—all sizes			
E. Summit, N. J.	2.10	2.35	2.15	1.75	1.75	.....
Eastern Mass.	.60	1.95	1.75	1.50	1.50	1.50
Eastern New York	1.00	1.80	1.70	1.50	1.50	1.50
Eastern Penna.	1.25	1.90	1.80	1.60	1.50	1.50
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60@ .80	1.60@1.75	1.50	1.25	1.10	.....
Oakland, Calif.	1.75	1.75	1.75	1.50	1.50	1.50
Richmond, Calif.	.50•	.....	1.75•	1.50•	1.50•	.....
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Springfield, N. J.	1.85	2.00	2.00	1.75	1.70	.....
Westfield, Mass.	.60	1.35	1.30	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Alexandria Bay, N. Y.	1.60	.....	1.30	1.50	1.20	.....
Berlin, Wis.	1.35	1.40	1.40	1.50	1.20	.....
Columbia, S. C.—Granite	.75	.....	2.75	2.50	2.35	.....
Dell Rapids, S. D.—Granite	.75	2.00	2.10	2.10	1.60	.....
Dundas, Ont.—Flint	1.00	1.50	1.50	1.50	1.25	1.20
Eastern Penna.—Sandstone	1.00	1.75	1.75	1.50	1.50	1.50
Eastern Penna.—Quartzite	.90	1.60	1.40	1.30	1.30	1.30
Holton, Ga.—Granite	.40	.....	2.50	2.25	2.25	2.00
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30	.....	1.20	.....
Los Angeles, Cal.—Granite	.....	1.25@1.50	1.15@1.40	1.15@1.40	.....	.....
Macon, Ga.—Granite	.50	.....	2.50	2.25	2.00	2.00
Middlebrook, Mo.—Granite	3.50@4.00	.....	.....	2.00@2.25	.....	1.50@1.75
Red Granite, Wis.	1.35	1.40	1.30	1.50	1.20	.....
Sioux Falls, S. D.—Granite	.75	2.00	2.00	2.10	1.60	.....
Stockbridge, Ga.—Granite	.50	2.00	1.90	1.75	1.75	.....
Utley, Wis.	1.35	1.40	1.30	1.50	1.20	.....

•Cubic yard. †Agrl. lime. ||R. R. ballast. ‡Flux ‡Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.50; bulk 2.75

Coldwater, N. Y.—Analysis, 56.77% $CaCO_3$, 41.74% $MgCO_3$, 70% thru 200 mesh, 95% thru 50 mesh, sacks 4.00; bulk 3.00

Grove City, Pa. — Analysis, 94.75% $CaCO_3$, 1.20% $MgCO_3$ — 70% thru 100 mesh; 80 lb. ppr., 5.50; bulk 4.50

Hillsville, Pa.—70% thru 100 mesh; sacks, 4.75; bulk 3.00

Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$, 5.25% $MgCO_3$; sacks, 4.50; bulk 2.75

New Castle, Pa.—89% $CaCO_3$, 1.4% $MgCO_3$—75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.00

Texas, Md.—Analysis, 58.02% $CaCO_3$, 37.3% $MgCO_3$—50% thru 50 mesh; bags, 4.25; bulk 2.50

Waltord, Pa. — 50% thru 100 mesh, 60% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.00

West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 5.00—cloth, 5.25; bulk .. 3.50

Williamsport, Pa. — Analysis, 88-90% $CaCO_3$, 3-4% $MgCO_3$—50% thru 50 mesh; paper, 5.50; bulk 4.00

CENTRAL:

Alden, Ia.—Analysis, 99.16% $CaCO_3$.... .80

Alton, Ill. — Analysis, 96% $CaCO_3$, 0.3% $MgCO_3$—90% thru 100 mesh.... 6.00

Bedford, Ind. — Analysis, 98.5% $CaCO_3$, .5% $MgCO_3$—90% thru 10 mesh ..... 1.60@2.00

Belleville, Ont. — Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Bettendorf, Ia.—Analysis, 96.14% $CaCO_3$, 2.5% $MgCO_3$—50% thru 100 mesh, 2.00; 50% thru 4 mesh..... 2.00

Buffalo, Ia.—90% thru 4 mesh..... 1.00

Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.3% $MgCO_3$ (90% thru 50 mesh, 2.00), 50% thru 4 mesh..... 1.50

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$—90% thru 4 mesh... 1.50

Columbia, Ill., near East St. Louis—½-in. down ..... 1.25@1.80

Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh..... 1.80@3.80

Elmhurst, Ill. — Analysis, 35.73% $CaCO_3$,, 20.69% $MgCO_3$—50% thru 50 mesh 1.25

Greencastle, Ind. — Analysis, 98% $CaCO_3$—50% thru 50 mesh..... 2.00

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$—90% thru 50 mesh..... 2.00

Marblehead, O.—Analysis, 33.42% $CaCO_3$, 4.29% $MgCO_3$—52.4% thru 100 mesh, 59.4% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk..... 3.00

Limestone screenings; bulk..... 1.50

McCook, Ill.—Analysis, 54.10% $CaCO_3$, 45.04% $MgCO_3$—100% thru ¼-in. sieve, 78.12% thru No. 10, 53.29% thru No. 20, 38.14% thru No. 30, 34.86% thru No. 50, 22% thru 100 1.50

Milltown, Ind. — Analysis, 93.10% $CaCO_3$, 3.2% $MgCO_3$—33.6% thru 100 mesh, 40% thru 100 mesh..... 1.50@1.65

Mitchell, Ind.—50% thru 100 mesh..... 2.00

Montrose, Ia.—90% thru 100 mesh..... 1.35

Ohio (different points), 20% thru 100 mesh; bulk ..... 1.25@1.50

Piqua, O. — Analysis, 82.8% $CaCO_3$, 8.2% $MgCO_3$; neutralizing power in terms of calcium carbonate, 95.3%—50% thru 100 mesh..... 3.25@5.00

50% thru 50 mesh..... 1.75@2.00

Ridgeville, Ind.—Analysis, 98% $CaCO_3$ 100% thru 4 mesh..... 1.75

River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk..... .80@1.40

Stolle, Ill., near East St. Louis on I. C. R. R. — Thru ¼-in. mesh — Analysis, 89.61% to 89.91% $CaCO_3$, 3.82% $MgCO_3$ 1.75

Stone City, Ia.—Analysis, 98% $CaCO_3$ 50% thru 100 mesh..... .50

Toledo, Ohio—¼-in. to dust, 20% thru 100 mesh 1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page.)

Whitehill, Ill. — Analysis, 97.12% $CaCO_3$, 2.50% $MgCO_3$ — 90% thru 100 mesh 5.00
50% thru 100 mesh 1.75
Yellow Springs, Ohio—Aanlysis 96.08% $CaCO_3$, 63% $MgCO_3$, 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk.... 4.25
SOUTHERN:
Barber, Va.—Analysis, 92 to 98% $CaCO_3$—Bags, 6.50; bulk 4.50
Blowers, Fla.—Analysis, 98% combined carbonates—75% thru 200 mesh..... 4.75
Cartersville, Ga.—Analysis, 96% combined carbonates — pulverized limestone ..... 1.75@2.00
Claremont, Va. (Marlime) — Analysis, 90% $CaCO_3$, 2% $MgCO_3$—(90% thru 100 mesh, $4.00), 50% thru 100 mesh 3.50
Dittlinger, Tex. — Analysis, 99.09% $CaCO_3$, .04% $MgCO_3$—90% thru 100 mesh ..... 2.00@3.00
90% thru 4 mesh ..... 1.00@2.00
Ft. Springs, W. Va.—50% thru 100 mesh 3.00
Grovania, Ga.—Analysis, 95% $CaCO_3$, no $MgCO_3$—50% thru 100 mesh..... 2.50
Knoxville, Tenn.—Pulverized 2.50
90% thru 100 mesh..... 2.00
90% thru 50 mesh..... 1.50
Ladds, Ga.—50% thru 100 mesh..... 2.00
Linnville Falls, N. C.—Analysis,, 53% $CaCO_3$; 42% $MgCO_3$—50% thru 100 mesh; sacks, 4.50; bulk..... 3.00
Mascot, Tenn.—Analysis 52% $CaCO_3$, 38% $MgCO_3$.
80% thru 100 mesh..... 3.00
All thru 10 mesh..... 2.50
80% thru 200 mesh..... 4.50
Paper bags, $1.50 extra per ton; burlap, $1.00 extra per ton.
Maxwell, Va. 2.50
Ocala, Fla. — Analysis, 98% $CaCO_3$—75% thru 200 mesh..... 4.50
WESTERN:
Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all to pass 14 mesh; bags, 6.50; bulk 4.50
Sacks, 15c extra, returnable.
Garnett, Okla.—Analysis, 86% $CaCO_3$, 50% thru 4 mesh ..... .50
Kansas City, Mo., Corrigan Sid'g—50% thru 100 mesh; bulk..... 2.00
Terminus, Calif. — Analysis, 96.2% $CaCO_3$, .04% $MgCO_3$—60% thru 200 mesh, 90% thru 100 mesh, 95% thru 50 mesh, 100% thru 4 mesh; sacks, 6.00; bulk 5.25
Tulsa, Okla.—90% thru 4 mesh..... .50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:
Baltimore, Md. ..... 2.25@2.75
Berkley Springs, W. Va..... 2.00@2.25
Cedarville and South Vineland, N. J. (damp) 1.75
Cheshire, Mass. ..... 5.00@7.00
Hancock, Md.—Damp ..... 2.50@3.50
Klondike and Pacific, Mo..... 2.00@2.50
Mapleton, Pa.—Dry 2.50
Damp 2.00
Massillon, Ohio 3.00
Millington, Ill. 1.75
Mineral Ridge, Ohio 3.00
Montoursville, Pa.—Green, washed..... 1.50@2.00
Oregon, Ill.—Large contracts..... 1.75
Ottawa, Ill. ..... 1.25@2.25
Pittsburgh, Pa.—Dry, 4.00; damp..... 3.00
Rockwood, Mich. ..... 3.00@3.50
Round Top, Md.—(washed-screened).... 1.25
St. Mary's, Pa.—Unwashed..... 2.25
Thayers, Pa.—Washed 2.50
Unwashed 2.00
Utica, Ill. ..... 1.25@1.75
Zanesville, Ohio 2.50
FOUNDRY SAND:
Albany, N. Y.—Sand blast..... 5.00@7.00
Molding fine, coarse and brass..... 1.75@2.50
Allentown, Pa.—Molding coarse & fine 1.50@1.75
Arenzville, Ill.—Molding fine..... 1.40@1.60
Beach City, O. — Core, washed and screened ..... 2.00@2.50
Furnace lining ..... 2.50@3.00
Molding fine and coarse..... 2.25@2.50
Bowmantown, Pa.—Core ..... 1.35@1.50
Molding, coarse ..... 1.80@2.00
Cleveland, O.—Molding coarse..... 1.50@2.00
Brass molding ..... 1.50@2.00
Molding fine ..... 1.50@2.25
Core ..... 1.25@1.50
Columbus, O.—Core ..... .40@1.25
Sand blast ..... 3.50@4.50
Furnace Lining 2.00
Molding fine ..... 1.50@2.25
Molding coarse ..... 1.50@2.25
Stone sawing 1.50
Traction ..... .40@ .75
Brass molding 2.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	**.75**	**.75**	**.75**	**1.00**	**1.00**	**1.00**
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		1.00		1.15		1.25
Farmingdale, N. J.	.48	.48	1.40	1.35	1.30	
Hartford, Conn.	**.90**		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.50	1.75		1.35	1.25
Ludlow, Mass.	**.75***	**.75***	**1.70**		**1.50***	**1.50***
Philadelphia, Pa.	.75	.75		1.40	1.25	
Pittsburgh, Pa.		1.30	1.30	1.30	.85	.85
Portland, Maine		.50	1.75		1.35	1.35
Texas, Md.		**1.00**			Pure white sand, 1.50	
Washington, D. C.	.60@ .75	.60@ .75	2.00	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.		.85				
Anson, Wis.	.40	.40@ .50		.90		.90
Attica and Covington, Ind.	.90	.90	.90	1.00	1.00	1.00
Barton, Wis.		.60	.70	.70	.70	.70
Beloit, Wis.		.60	.60		.60	
Chicago, Ill.		**1.75@2.23**	**1.75@2.43**			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.90@1.75	.90@1.25	.85@1.25	.90@1.25	.90@1.25	.90@1.25
Des Moines, Ia.		.40@ .65	1.60	1.60	1.60	1.60
Detroit, Mich.	.65	.65	.95	.95	.95	.95
Earlestead (Flint), Mich.	.70		60-40 sieves, .85; Pebbles, .95			
Eau Claire, Wis.	.50	.50	1.00@1.25	1.00	1.00	
Elgin, Ill.		.80	1.00	.80	.80	.80
Elkhart Lake, Wis.	.70	.58	.90	.90	.72	.72
Ft. Dodge, Ia.		1.22		2.17		
Grand Rapids, Mich.		.50		.83	.77	.77
Greenville, Mechanicsburg, O.	.80	.70	.80	1.00	.85	.80
Indianapolis, Ind.	.60	.60		**1.50**	**.75@1.00**	**.75@1.00**
Janesville, Wis.		**.65@** .75			**.65@** .75	
Le Mars. and Doon, Ia.		.90		**1.80**		
Libertyville, Ill.		.70		.70	.70	
Lincoln, Neb.		Sand .40, sand and gravel .80, drained for shipment				
Mankato, Minn.	.45	.45	.65	.65	.65	.65
Mason City, Ia.	.90	.80	1.90	1.80	1.70	1.65
Milwaukee, Wis.	1.15	1.15	1.25	1.25	1.25	1.25
Minneapolis, Minn.	.35@ .50	.35@ .50	1.50	1.50	1.50	1.25@1.50
Moline, Ill.	.50@ .70	.50@ .70	1.10@1.30	1.20	1.20	1.20
Oxford, Mich.		.40		.60	.60	
Riton, Wis.		.40			.50	.50
St. Louis, Mo., f. o. b. cars	1.20	1.35	1.50	1.30		1.25
St. Louis, Mo., delivered on job	2.05	2.20	2.35	2.15		2.10
Summit Grove, Clinton, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.75	.90	.85	.85	.75
Winona, Minn.	.60	.50	1.50	1.25	1.25	1.25
Yorkville, Moronts, Oregon and Sheridan, Ill.		.60@ .80	.70@ .80	.70@ .80	.70@ .80	.60@ .80
SOUTHERN:						
Alexandria, La.	.60@ .80					1.20@1.50
Birmingham, Ala.	1.48		all gravel—1.88			
Charleston, W. Va.			(Sand, 1.40@1.50; gravel, 1.50			
Estelle Springs, Tenn.	1.25	1.25	1.10	1.00	.90	.85
Ft. Worth, Tex.		2.00		2.00		2.06
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	1.15	1.15	2.12		1.92	1.74
Lake Weir, Fla.		.75				
Macon, Ga.		.50@ .75				
Memphis, Tenn.	1.12	1.12				**1.95**
N. Martinsville, W. Va.	1.10	1.10		1.30		.90
New Orleans, La.	**1.00**		**1.75**		**1.25**	
Pine Bluff, Ark.	1.00@1.25	.80@1.05	Washed gravel, all sizes, 2.20			
Roseland, La.	.25		1.00	1.00		
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton, Missouri River, .85)					
Niles, Calif.	1.00	1.00	1.40	1.00	1.00	1.00
Pueblo, Colo.	1.10*	1.00*			1.50*	
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.50*	1.50*	2.00*	1.50*		1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.75	.75	.75	.75	.75	.75
Boonville, N. Y.	**.60@ .80**		.55@ .75			**1.00**
Cape Girardeau, Mo.			River sand, 1.00 per yd.			
Cherokee, Ia.			.80 per ton—1.20 washed			
Detroit, Mich.	**1.10***					
Dudley, Ky. (Crushed Sand)..		1.05		1.00		
East Hartford, Conn.			.65 per cu. yd.			
Elkhart Lake, Wis.			Washed gravel .66			
Estelle Springs, Tenn.						.85
Fishers, N. Y.	.60	.65		.60		.50
Glenville, N. Y.				1.00*		
Hamilton, O.			.30 per cu. yd. in pit			
Hartford, Conn.		**1.00***				
Hersey, Mich.				.60	.60	**.60**
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Janesville, Wis.		.65			.65@ .75	
Lindsay, Tex.		1.50				.60
Oxford, Mich.				.65	.65	
Pine Bluff, Ark.			Road gravel .60			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Roseland, La.		.75				
Saginaw, Mich., f. o. b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.			60% gravel, 40% sand, 1.50			
Summit Grove, Ind.	.60	.60	.60	.60	.60	.60
Waco, Texas		.80		1.50		1.[illegible]
Winona, Minn.			.70	.70	.70	.70
Yardville, N. J.		.50@ .75				
York, Pa.		1.10@1.20		(crushed rock sand)		

*Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Buffalo, N. Y.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	3.50	1.10	2.50	1.25	1.25	1.25	1.25
Eastern Pennsylvania and Northern New Jersey	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Erie, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Lebanon, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.50	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.	All sizes, $1.50, F. O. B. Chicago						
Detroit, Mich.	All sizes, 1.65, F. O. B. Detroit						
Ironton, O.	2.40	1.75	Other grades 1.75				
Jackson, O.	2.00	1.35	1.70	1.35	1.35	1.35	1.35
Stuebenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	2.93	2.30	2.49	2.49	2.49	2.30	2.30
Youngstown, Dover, Hubbard, Leetonia, Struthers, Steubenville, Lowellville & Canton, O.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
SOUTHERN:							
Alabama City, Ala.	2.05	.80	1.00@1.25	1.15	1.05@1.10	.85@1.00	.85@ .90
Birmingham, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton & Low Moor, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing Hydrate	Masons' Hydrate	Agricultural Hydrate	Chemical Hydrate	Ground Burnt Lime Blk.	Ground Burnt Lime Bags	Lump Lime Blk.	Lump Lime Bbl.
EASTERN:								
Adams, Mass.						8.00		3.50
Bellefonte, Pa.			11.50		8.00			
Berkley, R. I.			14.00					
Buffalo, N. Y.		11.00	11.00	11.00			9.50	2.00*
Chaumont, N. Y.					2.50	4.00		
Chippewa, Pa.							3.50	
Lewisburg, Pa.							7.00	
Lime Ridge, Pa.					5.75			
Mt. Union, Pa.					7.50			
Paxtang and Le Moyne, Pa.					5.00		5.00@7.50	
Rockland, Maine						8.00		
Union Bridge, Md.			13.00		5.50			
West Rutland, Vt.						7.50		
West Stockbridge, Mass.			15.00					
Williams and Blue Bell, Pa.			11.25					
Williamsport, Pa.					10.00	10.00	6.00	
York, Pa.		10.50	10.50	12.00			8.00	3.00‖
CENTRAL:								
Delaware, Ohio	10.50	9.00	8.00	9.50			8.00	1.60
Geneo, Ohio	10.50§							
Gibsonburg, Ohio	10.50§							
Huntington, Ind.	10.50	9.00	8.50				8.00	1.70*
Knowles and Valders, Wis.			12.50		5.00	9.00		
Marblehead, Ohio		9.00	8.50				8.00	1.70*
Mitchell, Ind.		12.00	12.00	12.00			9.00	1.75*
Sheboygan, Wis.					5.50	8.50		
White Rock, Ohio	10.50							
Woodville, O. (dlrs.' price)	10.50a	9.00a	8.00a	9.00a	7.50	8.50	8.00	1.70
SOUTHERN:								
Knoxville, Tenn.	11.00	9.50	9.50				7.50	1.30
Sherwood, Tenn.	11.00	9.50	9.50	9.50	7.50		7.50	1.30
Staunton, Va.					8.00		9.50b	1.60
WESTERN:								
Colton, Calif.			15.00					
Kirtland, N. Mex.					12.00		12.50	2.00c
Los Angeles, Calif.			15.00‡					
San Francisco, Calif.			19.50				16.00	2.15*
Tehachapi, Calif.							13.00	2.00

‡100-lb. sacks; *180-lb. net, price per barrel; †180-lb. net, non-returnable metal barrel; ‖300-lb. bbl. §Paper sacks. a 50-lb. paper bags; terms, 30 days net; 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice. b Burlap bags. c 200 lb. bbl.

Miscellaneous Sands

(Continued from preceding page)

Conneaut, O.—Molding fine	2.25@2.50
Molding coarse	2.00@2.25
Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass Molding	2.15
Dresden, O.—Core and molding fine	1.25
Molding coarse	1.50
Brass molding	1.75
Dunbar, Pa.—Traction, damp	2.75
Traction, damp	2.75
Dundee and Chalfants, O.—Sand blast	3.00
Glass, core and traction	2.75
Molding fine and brass molding	2.25
Furnace lining	2.50
Molding coarse	2.00
Falls Creek, Pa.—Glass sand	2.50
Furnace lining, traction and molding coarse	2.00
Sand blast	3.50
Eau Claire, Wis.—Core	.75@1.25
Sand blast	3.00@4.25
Traction sand	.50
Franklin, Pa. and Utica, Pa.—Traction	2.50
Brass molding	2.25
Core	1.50@2.00
Molding fine	2.25
Molding coarse	2.00
Sand blast	3.00
Greenville, Ill.—Molding coarse	1.25@1.60
Howard, O.—Glass sand	3.00
Molding—Fine and coarse	1.75
Stone sawing	2.00
Core, roofing and brass molding	1.75@2.50
Sand blast, furnace lining and traction	2.50
Kansas City, Mo.—Missouri River core	.80
Kasota, Minn.—Molding coarse and stone sawing	1.65
Klondike and Gray Summit, Mo.—	
Molding fine	2.00@2.50
Molding coarse	2.50@3.00
Mapleton, Pa.—Core, furnace lining, molding coarse and brass molding	2.00@2.75
Molding fine	2.25@2.75
Roofing sand	2.00@3.00
Sand blast	1.50@2.00
Glass sand	2.25@2.50
Massillon, O.—Glass sand, molding fine and coarse, core, and furnace lining	2.50@3.00
Traction	2.50
Michigan City, Ind.—Core, glass, traction and brass molding	.30@ .40
Millington, Ill. — Glass, core, furnace lining, roofing and stone sawing	1.25@1.75
Mineral Ridge, O. — Core, molding, sand blast, roofing, etc., washed, screened (damp)	2.50
Montoursville, Pa.—Core	1.25@1.40
Traction	1.00
Brass molding	1.40
New Lexington, O.—Molding fine	2.00
Molding coarse	1.75
Sand blast	3.00
Glass, core and traction	2.75
Furnace lining	2.50
Brass molding	2.25

Miscellaneous Sands

(Continued)

Oregon, Ill.—Core and glass sand	2.00
Furnace lining	2.00
Molding fine and coarse	1.00
Sand blast	3.50
Ottawa, Ill.—Core, furnace lining, steel molding	1.50
Roofing sand	1.25@4.50
Sand blast	4.50
Ottawa, Minn.—Core	1.00@1.50
Glass, molding coarse, stone sawing (all crude silica)	1.00@1.50
Ridgeway, Pa.—Glass sand, green	2.25
Glass sand, wash	2.50
Molding, fine and coarse	1.20
Rockwood, Mich.—Core, damp	2.50
Roofing	3.00
Sand blast	3.50
San Francisco, Cal.—Glass and roofing	3.00@3.50
Core, molding fine and brass	2.30@2.60
Furnace lining and molding coarse	3.60@4.25
Coarse core sand	3.50@4.25
Sand blast	2.30@3.60
Stone sawing and traction	2.30
Thayer, Pa.—Traction	1.75
Furnace lining	1.00
Molding fine and coarse	1.00
Core—green	1.75
Utica, Ill.—Core, furnace lining	1.00@1.10
Molding, fine and coarse	.85
Stone sawing	1.25
Williamstown Junction, N. J.—Glass sand	2.80@2.90
Core, wet	2.50@2.60
Zanesville, Ohio—Molding fine	1.45@1.75
Brass	1.50@1.75
Molding coarse	1.25@1.50
Furnace lining	2.50
Glass, core and traction	2.50
Sand blast and steel molding	2.50
Pulverized silica thru 140 mesh	8.50
Thru 200 mesh	9.50

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude talc	4.00
Cubes	45.00
Blanks, per lb.	.02
Chatsworth, Ga.—Crude talc	8.00@10.00
Ground talc (150-200 mesh), bags	12.50
Pencils and steel workers' crayons, per gross	1.50@ 2.00
Chester, Vt. — Ground talc (150-200 mesh)	9.00@10.50
(In Kraft paper bags. $1.00 per ton less in burlap bags, plus 15c for each bag.)	
Emeryville, N. Y.—150-200 mesh; bags	14.00
Glendale, Calif. — Ground talc (150-200-mesh	16.00@30.00
(Bags extra)	
Ground Talc (50-300 mesh)	13.50@15.50
Gouverneur, N. Y.—Crude talc	4.00
Hailsboro, N. Y.—Ground Talc (150-200 mesh)	15.00@20.00
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	2.75@ 3.50
Ground talc (20-50 mesh), bags, 5.75@8.00; (200-350 mesh) bags	9.25@13.00
Johnson, Vt.—Ground talc (20-50 mesh), bulk	8.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@15.00
(Bags extra)	
Keeler, Calif.—Ground talc (200 mesh), bags	16.62
(Bags extra)	
Los Angeles, Calif.—Crude talc, f. o. b. mine	10.00
Ground talc (150-200 mesh)	20.00
Silver talc dust (600-mesh)	50.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@15.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	8.00@10.00
Ground talc (150-200 mesh); bags	9.00@16.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	8.50
(Bags $1.00 extra)	
Ground talc (150-200 mesh), bulk	10.00@15.00
(Bags $1.50 extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Rock Phosphate

Raw Rock

Per 2240-lb. Ton

Centerville, Tenn—B.P.L. 72% to 75%	6.00@8.50
B.P.L. 65%	6.00
Gordonsburg, Tenn.—B.P.L. 68%@72%	5.00@6.50
Mt. Pleasant, Tenn—Analysis, .70 B.P.L. (2000 lbs.)	7.50
Montpelier, Idaho—70% B.P.L.—Crude	5.00
Crushed 2-in. ring and dried	6.00
Paris, Idaho.—2,000 lb. mine run, B.P.L. 70%	4.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f.o.b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$ 9.30	$8.40	$8.10	$7.80
24x14	9.30	8.40	8.10	7.80
22x12	10.80	8.70	8.40	9.10
22x11	10.80	8.70	8.40	9.10
20x12	10.80	8.70	8.40	9.10
20x10	11.70	9.00	8.70	8.40
18x10	11.70	9.00	8.70	8.40
18x 9	11.70	9.00	8.70	8.40
16x10	11.70	8.40	8.40	8.10
16x 9	11.70	8.40	8.40	8.10
16x 8	11.70	8.40	8.40	8.10
18x12	11.10	8.70	8.40	8.10
16x12	11.10	8.70	8.40	8.10
14x10	11.10	8.40	8.10	7.80
14x 8	11.10	8.40	8.10	7.80
14x7 to 12x6	9.60	8.40	8.10	.....
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$7.50	$7.20	$5.75
22x11	8.40	7.80	7.50	5.75
Other sizes	8.70	8.10	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.
Granulated slate per net ton f. o. b. quarries, Vermont and New York, 7.50

(Continued from preceding page)

Ground Rock

Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. Ton	
Centerville, Tenn.—B.P.L. 70%—90% thru 100 mesh	9.00@10.00
B.P.L 75% (brown rock)	12.00
Mt Pleasant, Tenn — B.P.L. 68%—13% Phosphorus	7.50@9.00
14% Phosphorus	8.00
B.P.L. 65@70%	7.00@9.00
Norwills, Fla.—(Fla. Hard Rock)—B.P.L. 68%	10.00

Florida Soft Phosphate

Raw Land Pebble

	Per Ton
Bartow and Norwills, Fla.—B.P.L. 50%, bulk	6.00@ 8.00
B.P.L. 78%, bulk	13.50
Jacksonville (Fla.) District	10.00@12.00

Ground Land Pebble

	Per Ton
Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Lakeland, Fla.—B.P.L. 60%	6.00
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65-70% B.P.L.	6.00@ 7.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Bound Brook, N. J.—Trap rock, carload lots; bulk		2.30
Chicago, Ill.—Stucco chips, in sacks f.o.b quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	16.00@20.00	11.00@17.00
Lincoln, Neb. — Red, white, grey, in bags		30.00
Middlebrook, Mo.—Red granite; sacks	30.00@32.50	20.00@22.50
Milwaukee, Wis.	21.00@30.00	21.00@27.50
Missouri river points — Different colors	20.00@25.00	20.00@25.00
Piqua, O.—Marble	8.00@10.00	7.00@ 9.00
Sioux Falls and Red Granite, Wis.	7.50	7.50
Tuckahoe, N. Y.—White marble	7.00@12.00	12.00
Crushed white stone and marble dust in 100 lb. bags	6.50@12.00	
Tate, Ga.—White limestone, sacks extra	5.00@ 7.00	5.00@ 7.00
Wausau, Wis.	14.00@18.00	
Wisconsin and S. Dak. points—Granite, different colors, bulk or sacks	1.50@ 2.00	3.00@ 7.00
Granite dust in bags	6.00	

Concrete Brick

Prices given per 1,000 brick, f. o. b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	18.00	26.00@38.00
Bellow Falls, Vt.	18.00	25.00
Birmingham, Ala.	16.00	27.50@50.00
Bridgeport, Conn.	31.00	32.00
Rochester, N. Y.	21.00	
Eugene, Ore.	25.00	45.00@60.00
Friesland, Wis.	25.00	
Houston, Tex.	18.50	21.50
Lockport, N. Y.	17.00	
Omaha, Nebr.	16.00	30.00@35.00
Piqua, O.	18.00	25.00@50.00
Portland, Ore.	25.00	45.00@75.00
Rapid City, S. D.	20.00	30.00@60.00
St. Paul, Minn.	17.00	32.00@35.00
Salt Lake City, Utah.	20.00	40.00
Salem, Ore.	30.00	50.00@100.00
Seattle, Wash. (select)	20.00	50.00@75.00
Springfield, Ill.	18.00	20.00@25.00
Virden, Ill.	18.00	20.00@25.00
Wauwatosa, Wis.	14.00@15.00	30.00
Winnipeg, Man., Can.	19.00	40.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	8.00
Barton, Wis.	8.50
Bloomfield, Ont.	16.00
Boston, Mass.	12.00@13.00
Brighton, N. Y.	14.25
Buffalo, N. Y.	16.50
El Paso, Texas (Face 13.00)	14.00
Gary, Ind.	11.50@12.00
Grand Rapids, Mich.	13.00
Lancaster, N. Y.	13.50
Michigan City, Ind.	10.00
Miller, Ind.	10.00@10.50
Milwaukee, Wis. (delivered at job)	13.00
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.—Common	15.00
Face	25.00
Redfield, Mass.	15.00
Saginaw, Mich.	11.50
San Antonio, Texas—Common	16.00
Face	27.50
South Dayton, Ohio	14.50
Syracuse, N. Y. (delivered at job)	18.00
F. o. b. cars	16.00
Toronto, Can.	15.00
Washington, D. C.	13.50
Winnipeg, Can.	14.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	19.00	16.00
Baltimore, Md.	15.00	13.00
Boston, Mass.	24.25	20.00
Cincinnati, Ohio	16.70	14.50
Chicago, Ill.	20.00	.....
Dallas, Tex.	25.00	.....
Denver, Colo.	30.00	16.00
Detroit, Mich.	15.75	13.75
Fort Dodge, Ia.	19.70	17.00
Genoa, Ohio	10.50	.....
Grand Rapids, Mich.	15.65	.....
Gypsum, Ohio	13.90	.....
Los Angeles, Calif.	.....	30.00
Minneapolis, Minn.	29.00	22.00
Montreal, Que.	21.00	.....
New Orleans, La.	.....	17.25
New York, N. Y.	16.99	.....
Oakfield, N. Y.	16.70	.....
Plasterco, Va.	19.80	.....
St. Louis, Mo.	24.00	20.00
San Francisco, Calif.	25.40	22.00
Seattle, Wash.	24.00	.....
	Lump per 180-lb. Barrel (net) Finishing	Common
Atlanta, Ga.	2.00	1.60
Baltimore, Md.	.....	12.00
Boston, Mass.	3.40	3.10
Cincinnati, Ohio	.....	12.25
Chicago, Ill.	.....	1.65
Dallas, Tex.	.....	2.75
Denver, Colo.	2.95	.....
Detroit, Mich.	2.00	1.80
Los Angeles, Calif.	3.00*	3.00*
Minneapolis, Minn.	.....	1.50
Montreal, Que.	15.00†	.....
New Orleans, La.	.....	1.75
New York, N. Y.	.....	3.69*
St. Louis, Mo.	.....	1.65
San Francisco, Calif.	.....	2.25
Seattle, Wash.	3.50	2.75

*280-bbl. (net). †Per ton.

Portland Cement

Current prices per barrel in carload lots, f. o. b. cars, without bags.

Atlanta, Ga. (bags)	3.45
Boston, Mass.	2.86
Cedar Rapids, Ia.	2.28
Cincinnati, Ohio	2.37
Cleveland, Ohio	2.28
Chicago, Ill.	1.97
Dallas, Tex., incl. sacks 10c ea., 2.80; net	2.40
Davenport, Ia.	2.22
Denver, Colo.	2.90
Detroit, Mich.	2.31
Duluth, Minn.	1.95
Indianapolis, Ind.	2.23
Kansas City, Mo. (includes sacks)	2.85
Los Angeles, Calif.	3.31
Milwaukee, Wis.	2.19
Minneapolis, Minn.	2.26
New Orleans, La.	3.20
New York, N. Y. (includes bags) (10c per bbl. discount in 10 days)	2.50
Peoria, Ill.	2.14
Pittsburgh, Pa.	2.02
St. Louis, Mo.	2.25
San Francisco, Calif. (Pkge. 15c on and off.)	3.09
St. Paul, Minn.	2.26
Toledo, Ohio	2.31
Seattle, Wash., f. o. b. factory	2.75
F. o. b. Seattle	3.10

NOTE—Add 40c per bbl. for bags.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	——Plaster Board—— ¼x32x36" Weight 1500 lbs. Per M Sq. Ft.	⅜x32x36" Weight 1850 lbs. Per M Sq. Ft.	Wallboard. ⅜x32 or 48", Lengths 6'-10', 1850 lbs. Per M Sq. Ft.
Alabaster, Mich.	3.50	4.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Blue Rapids, Kan.	3.50	4.50	7.50	9.00	11.00	11.50	11.00	.....	23.75	20.00	19.375	20.00	36.75
Centerville, Iowa	3.50	4.50	7.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas, Ariz.	.....	.....	.....	.....	.....	11.00@12.00	.....	.....	.....	10.50@11.50	.....	.....	.....
†Eldorado, Okla.	.....	.....	.....	.....	11.00	11.50	.....	.....	15.50	.....	27.20	29.30	39.55
Fort Dodge, Ia.	3.50	4.50	7.50	9.00@11.00	11.00	11.50	16.45	.....	25.80	22.00	19.375	20.00	30.00
Garhutt, N. Y.	.....	.....	7.50	9.00	11.00	11.00	.....	7.50	.....	.....	.....	20.00	Plus bags
Grand Rapids, Mich.	3.50	4.50	7.50@8.50	9.00@12.00	11.00	11.00	19.50	.....	27.25	22.00	19.375@25.00	20.00@26.25	30.00
Gypsum, Ohio	3.50	4.50	7.50	9.00	11.00	11.00	20.25	8.00	27.95	20.00	19.375	20.00	30.00
Gypsumville, Man.	3.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hanover, Mont.	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Loveland, Colo	3.50	4.50	7.50	9.00	11.00	11.50	.....	.....	29.80	.....	.....	.....	.....
Oakfield, N. Y.	3.50	4.50	7.50	9.00	11.00	11.00	21.20	7.50+	28.25	22.00	19.375	20.00	30.00
Piedmont, S. D.	.....	.....	7.50	9.00	11.00	11.50	.....	.....	32.25	.....	27.97	31.04	41.18
Plasterco, Va.	4.50	.....	7.00	9.00	11.00	11.00	21.90	.....	29.90	20.00	21.375	22.00	.....
Rapid City, S. D.	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
†Southard, Okla.	3.50	4.50	7.50	9.00	11.00	11.50	11.00	.....	15.50	.....	26.20	28.70	39.40

NOTE—Returnable Jute Bags, 15c each, $3.00 per ton; Paper Bags, $1.00 per ton extra.
*Shipment in bulk 25c per ton less; †Acme, Tex., freight rates govern; ‡Bond Plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton additional.

General Market News

September Construction Activity Breaks Records

BUILDING CONTRACTS awarded during September in the twenty-seven Northeastern States, according to the F. W. Dodge Co., amounted to $246,186,000. This is not only the largest monthly total that has been reached this year, but it is also the largest September figure on record.

The September total shows an increase of 11½ per cent over the August figure; whereas, during the ten-year period previous to 1921, the average September figure is 14½ per cent less than the average August figure.

Although the greatest increase in September was evident in the New York district, substantial increases are noted in the entire Middle Western territory, comprising the Pittsburgh and Chicago districts. New England, the Northwestern States and the Middle Atlantic States showed the usual seasonal decline in September.

Residential building still leads among the various classes of construction, amounting to $95,303,000 in September. This figure represents 39 per cent of the total September construction.

Of even greater significance at the present time is the increase in volume of business buildings. The September figure was $41,259,000, the largest monthly total on this class since June, 1920. Business buildings represented 17 per cent of the September total. Construction was started on a number of long-deferred projects of this kind in September.

Public works and utilities amounted to $35,414,000 in September, or 14 per cent of the total; educational buildings amounted to $26,459,000, or 11 per cent of the total.

September's record of construction activity appears to indicate that a real revival is on the way.

Solvay and Semet-Solvay Events

A MORE normal outlook in the rock products industry is shown by the opening of the plant of the Solvay Process Co. plant at Delray, Mich., just outside of Detroit. The plant closed down on July 1 and it was said by officials that it would not open again for at least three months.

The new schedule of the Delray plant calls for half time operations. About 1,500 men were taken on during the first week of resumed operations, and the intention of the company is to gradually increase the number until approximately 2,500 men are employed there on January 1.

The caustic soda department of the Solvay Process Co. resumed operations on August 24 on a limited scale. It is understood that this was made necessary by the fact that orders for this product had increased materially during the last six weeks.

While executives will not say so officially, it is rumored that the caustic soda department of the big Syracuse plant of the Solvay Process Co. did twice as much business during July as in the months immediately preceding it.

At the Semet-Solvay Co. changes continue to occur. The most important was the resignation on Sept. 1 of Alfred W. Hudson, vice-president of the plant. Mr. Hudson, it is understood, will become vice-president of the Metropolitan Bank of New York City. Mr. Hudson was one of the principals, representing the Semet-Solvay Co., in working out the amalgamations of five big corporations into the Allied Chemical and Dye Corporation. Mr. Hudson was called to the company in 1918 to assist in solving its financial policies. In 1919 he was made a vice-president and also vice-president of the By-Products Coke Corporation. He remained in the latter position until the removal of the offices to Chicago in 1921.

Michigan Scale the Minimum for Indiana Rates

A CONFERENCE between Governor McCray of Indiana, the Indiana Railroads, and the State Highway Commission was held in Indianapolis, Ind., on Oct. 6, for the purpose of putting into effect a lower freight rate schedule, so as to facilitate highway construction.

The Highway Commission asked that the 40 per cent increase in freight rates be removed. The railways offered to substitute a 15 per cent increase for the 40 per cent, using the Southern Michigan scale as a minimum, but not to raise any existing rate, the reduction to become effective as soon as possible.

After considerable negotiation and dickering, the Highway Commission accepted the above proposal, conditionally. Should the Ohio reduction stand or the Michigan rates be lowered, the Indiana case will automatically be re-opened.

The highway Commission was fully informed as to the status of the rate question and what the above proposal meant, for it is the same proposal that was made to the State Highway Comission of Ohio and refused by that Commission. When applied to the actual movement of material, this reduction amounts to about 9 per cent. It is estimated that the rule applied to the Indiana rates will give not over 10 per cent reduction. The Highway Commission understood this at the time, but justified their acceptance of the proposal on the ground that the Indiana Public Service Commission has no authority and the whole situation was at the mercy of the railroads. In order to save money for the State on what small shipments will be made this fall, they took what they could get.

The case is by no means closed. The carriers intimated that the Ohio decision would be attacked.

With further reference to the rate decision reached at the conference the following figures will assist in understanding the adjustment proposed. This is a copy of Exhibit 4, submitted by Mr. Mathews, the witness for the carriers in the Ohio case.

Docket No. 2327—Public Utilities Commission of Ohio

1 Old Rate 8-25-20 Cents	1 Present Rate 8-26-20 Cents	2 Old Rate Plus 15% Cents	3 Michigan Scale Docket D-1522 Miles	3 Cents
35	49	40	5 and under	55
40	56	45	10 and over 5	60
45	63	50	15 and over 10	65
50	70	60	20 and over 15	70
55	77	65	25 and over 20	75
60	84	70	30 and over 25	80
65	91	75	40 and over 30	85
70	98	80	50 and over 40	90
75	105	85	60 and over 50	95
80	112	90	70 and over 60	100
85	119	95	80 and over 70	105
90	126	105	90 and over 80	110
95	133	110	100 and over 90	115
100	140	115	115 and over 100	120
105	147	120	130 and over 115	125
110	154	125	145 and over 130	130
115	161	130	165 and over 145	135
120	168	140	185 and over 165	140
125	175	145	205 and over 185	145
130	182	150	225 and over 205	150
135	189	155	250 and over 225	155
140	196	160	275 and over 250	160
145	203	165	300 and over 275	165
150	210	170		
155	217	180		
160	224	185		
165	231	190		
170	238	195		
175	245	200		
180	252	205		
185	259	210		
190	266	220		
195	273	225		
200	280	230		

When present rates are as shown in column 1 proposed rates are shown opposite in column 2 subject to mileage scale shown in column 3 as minimum with the present rates (column 1) as maximum. Rates in column 3 as minimum are for 1 line hauls; for 2 line hauls above figures to be plussed 12 cents per ton and for 3 line hauls above figures to be plussed 20 cents per ton.—*Indiana Sand and Gravel Producers Association News Letter.*

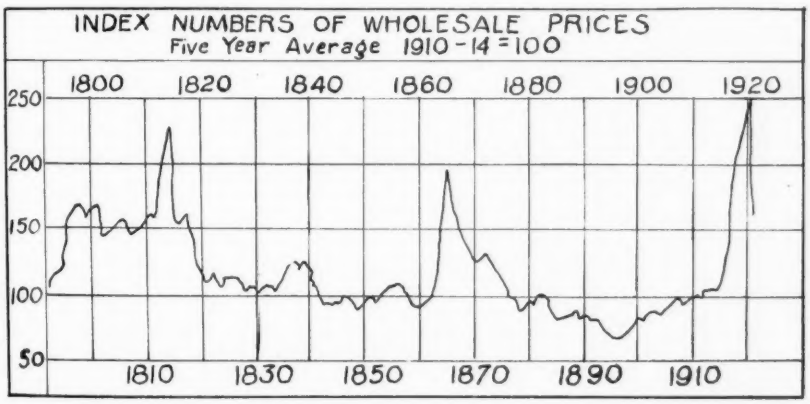
General Market News

Trend of Wholesale Prices

THE INDEX for wholesale prices for September 1 showed a general rise over the August 1 level. Of course the increase was not general or uniform. Cotton went up almost 100 per cent in a month, while the grains decreased. Steel wire prices advanced, indicating a change in the trend of steel and iron prices. This condition indicates that old stocks are about exhausted and that manufacturers and merchants may renew their stocks before the present bargain price opportunities vanish.

The question will naturally arise in the business man's mind—what is the "long pull" outlook for prices? Are we really rising on the tide or are we coming up on a wave that will soon spend itself and leave behind it a trough in a continuously ebbing tide? History indicates that we are not at the beginning of an era of rising prices, but are experiencing a slight recovery.

The chart, herewith produced, is taken from a very recent government publication and shows the course of prices over a period of about a century and a quarter. It will be seen that the two wars, 1812 and 1860, brought prices to high peaks, which peaks were followed by declines running from 20 to 30 years. The rise in prices at the present time would seem to correspond to the two little humps on the downward slide of each peak. Courage and plain honesty, therefore, require the statement that the present improvement may last for a year, but that probably we shall have to face further declines in the future. One of the worst things that could happen just now would be the artificial fostering of an over optimistic spirit, one that would lead to reckless over-production and betray us into such a violent and precipitate fall as will be noticed in the chart to have occurred after the reckless banking experiences that caused the abrupt increase in prices beginning in 1834.—*Illinois Concrete Aggregate Association Bulletin.*



Contractors Launch Campaign to Start Construction

IN A letter addressed to W. O. Winston, president of the Associated General Contractors of America, Herbert Hoover, at the close of the present session of the unemployment conference, declared construction to be the key to the present situation. For, as shown at the conference, every 200 men employed in actual construction sets to work from 500 to 700 men in other basic industries, such as lumber, cement, transportation, mining, manufacturing, etc. Mr. Hoover's letter follows in full:

October 13, 1921.

Dear Mr. Winston:

You have doubtless noted the emphasis placed on construction by the president's unemployment conference as a means of relief for the present unemployment.

As I am advised that you and several members of your executive board are about to make an extended trip in the interest of the construction industry. I express the hope that you will lay before the several communities you visit the importance of getting under way at once the construction program outlined, which is felt to be the key to the present situation.

Yours faithfully,

(Signed) Herbert Hoover.

To start this program, meetings of representative citizens and general contractors have been arranged in the principal cities of the country to discuss ways and means of getting it under way. W. O. Winston of Minneapolis, president of the Associated General Contractors of America; W. A. Rogers of Chicago, F. L. Cranford and D. A. Garber of New York, together with G. W. Buchholz, secretary, and E. J. Harding, assistant secretary of the national organization, will address the meetings in behalf of an aggressive program, both national and local, to start construction.

Stones Absorb Water

STONE is by no means impervious to water. Some kinds, notably coarse sandstones, hold a large percentage. Even marbles absorb considerable quantities. The absorptive capacity of limestones range from 7 per cent or more down to practically zero. Porous limestones, in which the pore space ranges from 10 to 15 per cent, will absorb from 4 to 6 per cent of water, according to the United States Geological Survey, Department of the Interior, whereas semi-crystalline and crystalline limestones or marbles have lower percentages of pore space and of absorption, such marbles as those from Vermont, Tennessee, and Georgia being almost non-absorbent. Pumice stone, which is usually lighter than water owing to its great amount of pore space, will absorb large quantities of water; obsidian and volcanic glass, which are of the same chemical composition as pumice stone but several times heavier than water, will absorb none. Quartzite, granite, and the numerous eruptive rocks are practically impervious to water.

Bigger Wheat Yield by Use of Rock Phosphate

EXPERIMENTS with rock phosphate on wheat have shown encouraging results, according to reports received at the agricultural experiment station of the University of Illinois from farm advisers.

In Bond County many experiments were made, with good results, by drilling phosphate rock in with the wheat just like commercial fertilizer. In one of these experiments one farmer got two bushels more wheat with 257 bundles that had been treated with 300 pounds of rock phosphate than he did from 270 bundles that had been treated with 200 pounds bone meal and acid phosphate mixed.

The results of these recent experiments in this county have been so encouraging that two cars of rock phosphate have been ordered for this community, most of which will be sown with wheat this fall.

News of All the Industry

Incorporations

The Cement Tile and Products Co. has been incorporated for $100,000. The attorney is The Colonial Charter Co., Wilmington, Del.

The Arizona Gypsum Products Co., Phoenix, Ariz., has been incorporated for $500,000 by F. L. Johnson, F. H. Swenson and W. J. Fellows.

The Greenstone Products Co., of Roanoke, Va., of which C. E. Crosby is president, will increase its capital stock from $300,000 to $500,000.

The Wisconsin Limestone Co., Waukesha, Wis., has increased its capitalization to $65,000. H. C. Meigs is president, and Wm. H. Halladay, secretary.

The Alabama Lime Co. has been incorporated in Chattanooga, Tenn., with a capital stock of $10,000, by Horace Hamby, C. A. Noone and C. N. Niles.

The Cudahy Lumber and Supply Corp., Cudahy, Wis., has been incorporated for $75,000, by W. F., H. T., and R. W. Rediske to deal in all kinds of building material.

The Badger Lumber and Supply Corp., St. Francis, Milwaukee County, Wis., has been incorporated for $100,000 by W. F., H. T., and R. W. Rediske.

The Acme Art Stone Shop, Los Angeles, Calif., has been incorporated with a capital of $20,000 to deal in quarry stone and to manufacture stone products.

The Fairmount Building Supply Co., has been incorporated in Fairmount, W. Va., with a capital of $100,000, by A. W. Binns, M. A. Joliff and F. J. Titherington.

The Roanoke Washed Sand Co. has been incorporated in Roanoke, Va., with a capital of $50,000, by W. W. Coxe, president; Jesse Cooke, secretary, and others.

Frank J. Grimm, Milwaukee, Wis., has been incorporated for $35,000 by F. J. Grimm, H. H. Karrow and A. E. Kossow to deal in lumber, fuel and all building materials.

The Chrystalloid Building Products Corp., has been incorporated in Seattle, Wash., with a capital of $50,000 by R. Tiefe, D. Holz, M. J. Reusz, R. P. Hofman and T. A. Coleman.

The Federal Concrete Pipe Co., Manhattan, N. Y., has been incorporated for $20,000 by B. F. Gay, N. Reardon, Jr., and E. M. Ohmsledt. J. B. Johnston, 100 Broadway, is the attorney.

The Red Wing Quarry Co., Ltd., Redwater, Ont., has been incorporated with a capital of $500,000 to carry on the business of quarry masters and stone merchants. Incorporators include John F. Bliesath, Highland Park, Mich.

The Cumberland Cement and Supply Co., Cumberland, Md., has been formed by a merger of the Cumberland Hydraulic Cement and Manufacturing Company and the Builders' Supply Company. William L. Sperry, who was president of the cement company, becomes president of the new organization, and Frank H. Woodruff, New York, who was president of the supply company, is made chairman of the executive board.

Quarries

Tomah Marble Works, in Tomah, Wis., has begun work on the erection of a factory building.

The La Carriere Bussiere Limited, St. Sebastien, Que., has been incorporated with a capital of $90,000 to produce and deal in quarry products.

Eureka, Kans.—The City Council has offered for sale the quarry near Freshwater Corners to the highest bidder. The quarry was purchased by the city for $13,500.

The Marathon Granite Co., Wausau, Wis., has increased its capitalization by $600,000 making the total capital stock $1,000,000. D. J. Murray is president and G. T. Silbernagel, secretary.

The Carbon Limestone Co., Youngstown, O., are planning the addition of another mill which will triple their present capacity.

The Hagersville Quarries, Ltd., 421, Coree St., St. Thomas, Ont., now own and operate the quarry of the Michigan Central R. R. Co., Hagersville, Ont.

The Webb City Stone Co., Webb City, Kans., has been organized and will erect a $5,000 mill for crushing and handling mine rock. Carl Steuck is president; P. Baden, secretary-treasurer; R. A. Bailey, traffic manager and A. S. Kerr, superintendent.

The Manegold Stone Co., Milwaukee, Wis., which was incorporated in 1914, has been dissolved. The company was incorporated for $8000. Louis Manegold was president and treasurer; W. R. Manegold, secretary, and W. A. Manegold, vice-president.

The Highway Stone Co., Webb City, Kans., has been organized by J. F. Todd and T. Walker for the purpose of supplying road bed ballast larger than gravel. There is said to be about 200,000 yds. of mine rock on the 70 acres. A mill costing $7,000 will be erected.

St. Paul, Ind.—During a windstorm recently considerable damage was done to some nearby buildings caused by the falling of the smoke stack at the stone quarry operated by Clyde Yater at St. Paul, Ind. The stack was 95 feet high and four feet in diameter.

Bedford, Ind.—Fire destroyed the large plant of the Indiana Quarries Co. near Oolitic recently. The loss, which is estimated by the company to be $12,000 to $15,000, is fully covered by insurance. The building, in which the lime kilns were situated was also used as the company's business office, and every branch of the business had its office in the building. The fire burned for two hours and whistles blew continuously for help.

Merced, Calif.—Van Hook and McMillan of San Francisco, who have recently taken a lease on a lime deposit at Jenkins Hill, 65 miles up the Yosemite Valley railroad from Merced, have been consulting with Manager W. L. White of the Y. V. in regard to the installation of a sidetrack at the place. They will begin the organization of a company at once to install a crushing plant, and will begin operations probably by early next year. The output will be crushed lime rock for fertilizing purposes. They will establish a distributing plant in Merced. There is great need for the fertilizer in all parts of the San Joaquin valley.

Sand and Gravel

J. T. Cross, County Judge, Odessa, Tex., is in the market for machinery for excavating and loading gravel at the pit and unloading from the cars.

The Springer Transfer Co., Albuquerque, N. Mex., has erected an electrically driven screening plant, located on the Santa Fe R. R. for grading sand and gravel to proper sizes for commercial use. It is one of the pioneer industries of Albuquerque and has done much to popularize concrete.

The Rosoff Sand and Gravel Co., Marborough, N. Y., are working extra time at their big sand bank in order to supply New York and other nearby points with their material. There is a noted resumption of building operations in that part of the country. In addition to New York orders the gravel bank has been filling an order of some 15,000 cubic yards for the firm of Terry & Tench, who are now completing the Rondout bridge before Kingston.

Cleveland, Ohio—Plans for operating one of the largest sand and gravel pits in the northern Ohio district are being made by Roy Black, Cleveland, O., investor, following the purchase of a tract estimated to contain 4,000,000 tons of the material. The tract was bought from John F. and Barbara Singleton and is in the Newburg section of the city. The property is situated close to the New York Central Lines, Baltimore & Ohio and Newburg & South Shore railroads.

The Department of Inland Revenue, Canada, has issued the following bulletin in regard to the sales tax on sand and gravel:

"You are advised that owners of gravel pits, or wholesale dealers in sand and gravel, will be held strictly accountable for the proper payment of sales tax on sales of sand or gravel, on or after the 10th of May last. If such pit owners or dealers collected the sales tax from their customers prior to the above mentioned date, they must remit the taxes collected to the Department."

Evansville, Ind.—Announcement has been made by the Bedford Nugent Sand and Gravel Co. of this city that they will open a new plant at Rockport, Ind., on the Ohio river a few miles east of here. Owing to the large territory covered by the company, it is necessary to establish a new receiving and shipping point and Rockport is considered the most desirable point for a branch for the company. Building operations probably will be started about the middle of the winter. No plans have been completed as to what kind of structure the local company will erect at Rockport.

The Pennsylvania Glass Sand Co., Pittsburgh, Pa., plans to erect a mill on a seven acre site in Rochester, N. Y. The tract has excellent railroad facilities, being served by three lines, the Pennsylvania, Buffalo, Rochester and Pittsburgh and New York Central, all of which have switches on the property. The Pennsylvania Glass Sand Co. is a million-dollar concern, with several mines in Pennsylvania and West Virginia and a number of branches in this country and Canada. It will import feldspar rock from Canada for the Rochester mill and grind it here and treat it so that it can be used in hardening pottery. The rock will be imported the year-round by car ferry. It is expected that about 25 or 30 men will be employed at the plant and $50,000 will be spent in erecting and equipping it. It will be ready by early winter. The site was chosen by W. J. Woods, assistant general manager of the company.

The Columbia Sand Co., Oswego, N. Y., a recent company which is developing one of the largest sand and gravel pits in this section of the state, expects to install machinery this year that will enable the company to go into the business on a large scale and ship gravel and sand to all parts of the state in addition to taking care of the construction needs of this vicinity. The present deposit on which the company is working is 90 ft. in thickness in a side hill, from which it may be excavated, screened and loaded at a minimum cost. The deposit is estimated to be 1200 ft. by 1500 ft., all of first quality material and with but six in. of surface soil to be stripped away to lay the entire deposit clear for working. The company will put in a rock crusher this fall, a belt conveyor, a 90-ft. derrick with orange peel and clam shell buckets and other equipment with which to get out a maximum production. At present the plant is turning out 200 yards a day, all the requirements of the contractors in town now, but it has contracts in view that will call for several hundreds of yards additional daily, and is making plans to keep four motor trucks busy hauling. The pit is but a 30-minute haul from the city.

Cement

The Signal Mountain Portland Cement Co., Chattanooga, Tenn., will be ready for bids on its plant about Nov. 15.

The Missouri Portland Cement Co. has reopened its plant at Cement City after a shutdown of more than 2 months. They will begin work with 200 men.

The Bonner Springs Portland Cement Co., Kansas City, at their stockholders' meeting re-Kansas City, Mo., at their stockholders' meeting re-elected Henry McGrew president and general manager. These directors were also re-elected: H. McGrew, P. Graff, H. W. Steeper, L. Graff, C. Sondereger, C. C. McCarthy and H. H. Kinmeal. The plant is operating at full capacity.

The Glens Falls Portland Cement Co., Glens Falls, N. Y., has moved into its new fireproof office building which has just been completed. The cornices were built of concrete and the company used their own cement wherever possible. The structure is one story high. The laboratory, one of the best equipped in the cement industry, is located in the basement.

Solano County, Calif.—The State Railroad Commission ordered a complete investigation of freight rates on cement in California. This follows complaint made by the Pacific Portland Cement Co., charging that rates from cement, Solano County, were discriminatory as compared with rates given competitive plants in San Juan and Davenport, Santa Cruz County.

The Canada Cement Co., at their annual meeting, Oct. 3, elected F. P. Jones, vice-president and general manager, president, to succeed the

late Senator Edwards. A. E. Tagg succeeds the late J. M. Kilbourn, as vice-president. H. J. Fuller, president of the Canadian Fairbanks-Morse Co., succeeds Mr. Jones as vice-president. G. C. Edwards and T. A. Russell were elected to the directorate.

Owen Sound, Canada—Establishment of a large cement mill at Owen Sound by American capitalists is a possibility if the Ontario government has definitely decided not to proceed with a cement plant. The American syndicate's plant is understood to be still in an uncertain state due to the government's proposed plans. The syndicate was considering the matter a year ago but waited on account of the above reason. The purchase of the Sun cement plant on the west side of the harbor was contemplated and it was proposed to build additions that would make possible 3000 to 4000 barrels production daily. Since the first move by the government the price of cement has dropped considerably and the government is not likely to erect a plant now. If the government proposal falls through the privately owned plant may be undertaken at an early date.

Lime

The Security Cement & Lime Co., Hagerstown, Md., will construct eight reinforced concrete bins 30 ft. in diameter and 70 ft. high.

The American Manganese Co., of Chicago, Ill., is reported to be contemplating the erection of a $175,000 plant in Penters Bluff, Ark., to develop a limestone acreage, to make hydrated lime, etc.

The Longview Lime Co., Longview, Ala., reports that plants in and around Birmingham are operating full time and the company is behind on its orders, though operating at capacity. The Longview Co. operates 10 kilns and employs 300 men.

Plumas County, Calif.—Announcement is made that work is to start shortly on the large quarry of the Plumas Lime and Rock Co. at Sloat. A spur track is to be built as well as kilns and other necessary structures. The company has one of the best lime rock deposits in the State, of exceptionally high grade, and will have no competition in the Sacramento Valley.

Richard K. Meade & Co. has been retained by the Bathurst Company, Ltd., Bathurst, N. B., to prepare plans and specifications for a lime plant to furnish lime for their pulp mill. The plant will include two of the latest type Meade kilns equipped with automatic stokers and induced draft. The stone will be handled by means of a platform elevator and the buildings will be of reinforced concrete. There will also be a reinforced concrete pocket for coal.

The Lehigh Portland Cement Co. has, for many years, operated a large lime plant at Mitchell, Ind., as a subsidiary company under the name of the Mitchell Lime Co. In order to show more clearly the relationship between the lime company and the cement company, the corporate name of the former has been changed, effective September 14, 1921, from Mitchell Lime Co. to Lehigh Lime Co. The products will be sold under the brand of "Lehigh Lime." There will be no change in the organization, and B. L. McNulty will continue as general manager.

Clark County, Ind.—Following years of decline in the lime burning industry in Clark County, Ind., across the Ohio River from Louisville, the activity is being revived, in the vicinity of Utica, Sellersburg and Charleston as well as other points. The largest of the kilns now operated is that of Charles Akers, at Utica. It is reported that demand for building operations is increasing, while agricultural demand is also greater. Formerly some large kilns were operated at Utica and Charlestown Landing, on the Ohio River, by Amos Murry, for William Steelman.

Phosphate Rock

The Bear Lake Phosphate Mine, Paris, Idaho, opened up its mine recently after being closed since last winter. A small working force will be maintained at present and will probably be increased later.

The Montana Phosphate Co., Philipsburg, Mont., has one of the largest single-bed phosphate deposits in the world, according to Geological Survey engineers. At least 70,000,000 long tons are believed to lie above water level, and the deposit is supposed to extend 1500 ft. below water level. Adjoining is an immense deposit of high grade limestone.

The American Agricultural Chemical Co., Boston, Mass., producers of phosphate rock and manufacturers of acid phosphate, closed its fiscal year June 30, 1921, with a surplus of only $2,669,950. This compares with a surplus of $18,105,305 reported twelve months ago. This big shrinkage was brought about by a net operating deficit for the fiscal year just ended of $6,136,710. On account of inventories written down to market values a further loss of $5,022,731 was sustained and surplus was dipped into to pay $4,276,914 of dividends. In the preceding fiscal year the company earned $11.18 a share on its common stock.

Gypsum

The Southern Gypsum Co., of North Holston, Va., of which Frank A. Wilder is president, is in the market for a large steel jaw crusher.

The California Gypsum Corp., San Diego, Calif., has obtained a tideland lease on 40 acres of land eastward from the San Diego-National City boundary. The lease, which is for 25 years' duration, was obtained, it is reported, for the purpose of erecting two factories, one for the manufacture of wall board and the other for making hollow gypsum blocks. Both products are in big demand in the building market. The tidelands lease was obtained under the State Harbor Commission's advertisement of August 24.

Concrete Products

Horrigan and Payne, 65 Fourth St., Brooklyn, N. Y., will engage in the manufacture of concrete roofing tile.

The J. D. Blackard Stave and Cooperage Co., Stuart, Va., is contemplating installing machinery for making concrete blocks.

The Frontenac Floor & Wall Tile Co. of Kingston are erecting a grinding plant for the grinding of feldspar used in the manufacture of floor tile.

The Hydro-Stone Forreston Co., Forreston, Ill., is building a $40,000 plant to manufacture concrete architectural trim stone. This is a subsidiary of the Hydro-Stone National Co., Ltd., of Chicago, which it is said contemplates the establishment of a national chain of plants.

Personal

Chas. Willums, Jr., Erwin, Tenn., is in the market for a pulverizing mill to grind feldspar.

A. Dowker, formerly engaged in the manufacture of brick at McIrvine, Ont., is going into the rock crushing business at Fort Frances, Ont., where he has leased the town's rock crushing plant and storage bins.

Burdette S. Wallace, specification engineer for the Semet-Solvay Co. for the last nine years, has announced his resignation from the services of the company. He will become associated with Kirby, Lloyd & Co., specializing in handling investment bonds.

Obituary

Joseph S. Irvine, representative of the Portland Cement Co., at Ottawa, died suddenly in Toronto on September 26.

Manufacturers

The Southern Cement Block Machine Co. will establish a plant in Orlando, Fla., to manufacture the machine of which Samuel Lindsey is the inventor.

The Universal Crane Co., Elyria, Ohio, announces that Geo. L. Sawyer, formerly sales manager of material handling machinery for Barber-Greene Co., Aurora, Ill., has been appointed to represent them in the New York field in the sale of Universal Cranes. His offices are at Allied Machinery Center, 141 Center St., New York City, New York.

S. Flory Manufacturing Co., Bangor, Pa., has just issued several bulletins dealing with cone friction hoists, band friction hoists and capstans. The bulletin on capstans deals with both steam and electric types and also capstan type car pullers. The bulletin on band friction hoists deals with an improved band friction device, a new manufacturing development. The bulletins referred to are now ready for distribution to the trade.

The Bradley Pulverizer Co., Allentown, Pa., has issued Catalogs No. 45 and 46, dealing with the improved Griffin mill and the Bradley 3 roll mill. The bulletin on the Griffin mill gives the complete specifications and also presents a short treatise on the development of the mill and its fundamental features. The bulletin on the Bradley 3 roll mill has the same general characteristics as the bulletin mentioned above. Both catalogs are ready for distribution to the trade.

The Jeffrey Manufacturing Co., Columbus, Ohio, announces that H. W. Scott will be in charge of their Cleveland office, 437 Leader-News Building, and C. R. Heller will be in charge of the Buffalo office, 1108 Marine Trust Building. Both of these gentlemen have had a thorough training in the sales and engineering departments of the Jeffrey Co., and are well qualified to render valuable assistance to clients in their territory in helping to solve their material handling requirements.

The Blaw-Knox Co., Pittsburgh, Pa., announces the addition to its staff of H. O. Davidson. Mr. Davidson will have entire charge of the Prudential Sectional Building Department of the Blaw-Knox Co. and will be also general manager of the C. D. Pruden plant of the Blaw-Knox Co. Mr. Davidson will be located at the C. D. Pruden plant, Baltimore. He was connected for 8 years with the Hydraulic Steelcraft Co., being general manager of that organization at the time he severed his connections to become a member of the Blaw-Knox staff.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of Rock Products, published every other week at 542 S. Dearborn St., Chicago, Illinois, for October 1, 1921.

State of Illinois, County of Cook.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Geo. P. Miller, who, having been duly sworn according to law, deposes and says that he is the manager of the Rock Products and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Tradepress Publishing Corporation, Editor, Nathan C. Rockwood, Managing Editor, Nathan C. Rockwood, Business Manager, Geo. P. Miller, all at 542 S. Dearborn St., Chicago, Ill.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) W. D. Callender, Wm. B. Mayor, T. J. Sullivan, 9 S. Clinton St., Chicago; Tradepress Publishing Corporation, N. C. Rockwood, C. O. Nelson, A. H. McQuilken, Geo. P. Miller, D. R. Hicks, H. P. Sessions, C. A. Breskin, Forrest O. Poor, all of 542 S. Dearborn St., Chicago, and Chas. H. Fuller, New York City.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) There are none.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is .....

(This information is required from daily publications only.)

(Signed) GEO. P. MILLER,
Business Manager.

Sworn to and subscribed before me this 24th day of September, 1921.

(Seal) MABEL OLSEN, Notary Public.

(My commission expires April 12, 1922.)

Form 3526.—Ed. 1916.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. please send check with your order. These ads must be paid in advance of insertion.

New Rubber Belting

300 ft. 12″ 6-ply	$0.99 per ft.
423 ft. 14″ 5-ply	1.04 per ft.
527 ft. 14″ 6-ply	1.25 per ft.
529 ft. 16″ 6-ply	1.39 per ft.
520 ft. 16″ 8-ply	1.90 per ft.
150 ft. 18″ 6-ply	1.48 per ft.
512 ft. 18″ 8-ply	2.00 per ft.

Rolls cut to any length.

The National Belting & Salvage Co.
268 East Water Street, Milwaukee, Wis.

Crushing Plants

No. 3 and No. 4 complete portable champion crusher, elevator, bin and screen.
No. 4½ Stat. Champion crusher, 50′ elev., 32″ x 12′ screen, 60 H.P. boiler, 50 H. P. engine, quarry cars, track, hoist, etc.
No. 6 Stat. Champion crusher, 40′ elev., 42″ x 20′ screen, 40 H. P. boiler with eng. mounted.
No. 2½ Climax 10 x 20, elevator, bin and screen. 18″ bucket wagon loader.
No. 3 and No. 4 Keystone graders.
Crushers, hoists, rollers, elevs., etc.

The Cable Excavator Co.
Fernwood, Del. Co., Pa.

EQUIPMENT BARGAINS

3-ton Plymouth 4′ 8½″ ga. Gasoline Locomotive.
7x12 cyl. 36 in. gage Davenport Saddle Tank.
10—24 in. gage 1½-yd. Western Dump Cars.
15—36 in. gage 4 yd. Western Dump Cars.
3—16 yd. Western Air Dump Cars.
1—⅝ yd. Thew "O" Traction Shovel.

ZELNICKER IN ST. LOUIS
"Everything for the Quarry"

WANTED

One 30-inch Griffin mill.

Kosmos Portland Cement Co.
Louisville, Ky.

Classified Advertising

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Help Wanted

WANTED

Young man familiar with quarry work, lime burning, crushing and conveying machinery, to take charge of going plant in Massachusetts. Reply to

Box 1506, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

WANTED

2 end dump quarry cars, steel body 1½ yd. 36″.
1 No. 2 Gates Gyratory Crusher.

Give complete description in first letter, also location.

Wabash Stone Co., Geneva, Ind.

Miscellaneous

Opportunity Knocks!

To anyone wanting to get into building stone production in a big way, on eve of the tremendous building boom that's coming, we offer for lease, one of the finest Bluestone properties in the United States. Inexhaustible supply of stone, excellent quarry plant, splendid mill and a market in Metropolitan District only limited by ability and working capital. Going concern, one man with other interests that cannot be denied and job is too big for him anyway. Lease—on low royalty basis—calls for no permanent investment, only working capital—and $10,000.00 would swing it. Don't write unless you mean business. Address

"Opportunity," care Rock Products
542 S. Dearborn St. Chicago, Ill.

Miscellaneous

FOR SALE

1 35 H.P. open case Bessemer Gas Engine fitted with HW Type electrical ignition. Practically new. Used less than two months.

Above machinery in best condition, ready for use, and offered for sale, only because being replaced by machine of larger capacity.

Can be inspected at our plant at Leesburg, Pa.

Leesburg Silica Sand Company
New Castle, Pa.

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

DRYERS

Having purchased 30 dryers 4'-0" dia. x 30'-0" long, with rollers, tires, gears, shafting, blowers, etc., we are prepared to offer them at a sacrifice before removal. Dryers are new and were never used. Furnace grates and doors or steam coils supplied. Write for price.

McDermott Bros. Co.
Allentown, Pa.

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25', 3½ x25', 4x30', 5½x50' 6x50' and 7x60'; double shell dryers, 4x20', 5x30' and 6x35'; steam-heated air rotary dryers, 4x30' and 6x30'.

KILNS—Rotary kilns, 3½x25', 5x60' and 6x70', 6x100', 7x80' and 8x110'.

MILLS—6x8', 6x5', 2½x3" 3x3½' pebble and ball mills; 8x4', 6x4' and 4x4' continuous ball mills; 3' March mill; 42", 33" and 24" Fuller-Lehigh mills; **4½x20', 5x11', 5x20', 5½x22' and** 6x20' tube mills; 7½x13", 9x15", 16x10" and 30x60" jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; **one Kent type "G" mill; 36" and** 40" cage mills; 3' and 4½' Hardinge mills; 18x12", 20x12" and 30x10" roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one **No. 2 Sturtevant ring roll crusher; 3 roll and** No. 000, No. 00 and No. 0 Raymond mills; one No. 5 Telsmith breaker; one 36" Sturtevant emery mill; one 3 roll Griffin mill; 60" chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; one keystone excavator; 6x8', 6x5' and 4x3' Newaygo vibrating screens, Richardson **automatic scales.**

Air compressors and tanks.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

Large Crushers

JAW: 24x36-in. Farrel type 15B. 10x36-in. type 22B. Virginia delivery.

Gyratory: Two No. 6 Chalmers & Williams. New Jersey delivery.

All good condition. Do you want details on these or other sizes? Relaying rails in stock.

E. H. Wilson & Company
Commercial Trust Building
PHILADELPHIA

One 50-ton, standard gauge Baldwin Mogul; 170 lbs. pressure.

One 56-ton, standard gauge American 10-wheeler; 175 lbs. pressure.

Two 50-ton, standard gauge Brooks 6-wheel switchers; 160 lbs. pressure.

One 42-ton, standard gauge Shay geared locomotive.

One 24-ton, standard gauge Shay geared locomotive.

One 14-ton, 36" gauge American Saddle Tank.

Two 23-ton, brand new 36" gauge Porter 6-wheel switchers; separate tenders.

One Model 14-B Bucyrus Shovel.

The above are only a few items of our stock. Will gladly send you our complete stock lists.

Birmingham Rail & Locomotive Co.
Birmingham, Ala.

FOR SALE

1 No. 18 Universal Crusher Company Pulverizer. Practically new, used less than one week. Rated capacity, 12 tons per hour through an ⅛" Screen. Large capacity through screens ¼" to 1½".

Above machinery in best condition, ready for use, and offered for sale, only because being replaced by machine of larger capacity.

Can be inspected at our plant at New Castle, Pa.

UNIVERSAL SAND COMPANY
New Castle, Pa.

FOR RENT AND SALE

13—6-yd. re-built dump cars, std. gauge.
20—12-yd. Westerns, like new, std. gauge.
50—60,000-lb. capacity flat and box cars.
1—Western standard gauge spreader.
1—Osgood 18 revolving shovel, traction wheels, No. 794, ¾-yd. bucket, used 8 mos.
1—Marion 36 combination shovel and drag-line, No. 4725, caterpillar traction, 1½-yd. bucket; used 4 mos.; built March, 1921.
1—Marion 76 steam shovel, No. 3503, std. gauge.
1—Marion 76 steam shovel, No. 3503, std. gauge.

LOCOMOTIVES

2—32-ton Vulcan four-driver saddle-tank, used sixty days; built March, 1921.
1—40-ton 17x24 in. four-wheel switcher.
2—50-ton 18x24 in. six-wheel switchers.
2—NEW 25-ton six-wheel Porters, separate tenders, 36 in. gauge.
2—18, 14, and 10-ton Vulcans, 36 in. gauge.

Locomotive-Cranes, Railway Equipment, Etc.

INDUSTRIAL EQUIPMENT CO.
McCormick Building Chicago, Ill.

New—RAILS—Relaying

All sections on hand for quick shipment Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa

NO. 8-D, GATES GYRATORY CRUSHER

STANDARD DRIVE

Fitted with manganese head and concaves. Included with this crusher, we have the following extra spare parts:

1 New, Manganese head.

1 New, set of manganese concaves.

1 New, main shaft.

1 New, Spider, and 2 New, eccentrics.

We also have many other sizes and types. We specialize in good quarry equipment of all classes. Write us fully.

Reading Engineering Co., Inc.
1227 Tribune Bldg., New York, N. Y.

IMMEDIATE DELIVERY

NO'S. 6, 7½, 9, 10 AND 18 CRUSHERS

No. 10 McCULLY CRUSHER.
50-75 HP. single drum 25 Cy. Motors.
25-50-100 Kw. Eng. and Turbo Sets, Dir. Cur.
250-300-500 Kw. Turbo and Eng. Sets.
BELT AND STEAM DRIVEN COMPRESSORS, 50-5000 ft.
5-6-12 Ton 24-in. Gauge Gasoline Locomotives.
Belt Driven Compressors, 50-3000 ft.
6-8-10-in. Sand Pump, belt drive.
25-40 HP. double drum Elec. Hoist, 440 V. 60 Cy.
5-10-15 Ton Holt Tractors.
2—290 HP. NEW B. & W. 200 lb. boilers steel casings.
150 HP. 125 lb. H. R. T. Boiler—Buttstrap, Indpls.
9K GATES REGULAR DRIVE, BARGAIN.

Send Us Your Inquiries Centrif. Pumps, Motors, Compressors and Electrical Equipment

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

FOR SALE

1—Sturtevant No. 2 Ring Roll Mill.
1—Sturtevant No. 1 Rotary Fine Crusher.
2—18" Belt Conveyors 70 ft. long.
1—10"x16" Jaw Crusher.

Hulbert A. Bond, Rowayton, Conn.

WANTED

1—No. 8 or No. 9 Gates crusher.
1—No. 7½ or No. 6 Gates crusher.
1—No. 5 Gates crusher.
1—60" Gates screen, 16 or 18' long.
1—24" bucket elevator.
1—45 to 60 ton steam shovel. Bucyrus or Marion.
1—Hundred horse power motor.
1—35 horse power motor.

Lincoln Crushed Stone Company
Joliet, Illinois

Overhaul Your Plant

If your plant is not working to capacity, now is the time to make changes and repairs.

Designing and constructing of complete Sand and Gravel Screening and Washing Plants, Stone Crushing and Storage Plants, Conveying Systems, Contractors' Material Plants, Electric Generating Plants and Transmission Lines.

Estimates and Plans Furnished

James N. Hatch, C. E., M. E.
Member A. S. C. E.
CONSULTING ENGINEER
736 First National Bank Bldg. Chicago, Ill.

Robert W. Hunt Jno. J. Cone D. W. McNaugher

ROBERT W. HUNT & CO.

Inspection—Tests—Consultation

Inspection New and Second Hand Machinery, Pumps, Crushers, Steam Shovels, Cars, Locomotives, Rails and Quarry and Contractors' Equipment

INSPECTION AND TESTS OF SAND, GRAVEL, CEMENT, STRUCTURAL STEEL, CASTINGS AND CONSTRUCTION MATERIALS

Cement, Chemical and Physical Testing Laboratories

New York CHICAGO Pittsburgh
St. Louis Kansas City Cincinnati San Francisco

BACON-FARREL ORE & ROCK CRUSHING-WORLD KNOWN ROLLS-CRUSHERS

EARLE C. BACON, INC. ENGINEERS
26 CORTLANDT ST., NEW YORK

We Design and Equip Complete Plants

for the manufacture of gypsum products, such as wall plaster, moulding plaster, wall board products, gypsum block products, also mixing plants.

We are prepared to furnish complete machinery-equipment and design and furnish plans for the installation. Consult our Engineering Department. Forty years' experience in designing of wall plaster machinery and plants.

The J. B. Ehrsam & Sons Mfg. Co.
Engineers, Machinists and Founders
Enterprise, Kansas

The Morgan Producer Gas Machine

is the highest class gas producer built in the U. S. and is advertised in this journal the first issue of each month.

Morgan Construction Company
Worcester, Mass.
Pittsburgh Office: 704 Arrott Bldg. Telephone Court 1381

Maddox Foundry & Machine Company

ARCHER, FLORIDA

Manufacturers of the

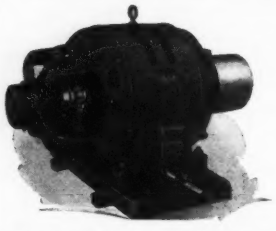
Abbott Improved Crusher Feeder

Indispensable where clay or sticky material is mined.

We manufacture washing, crushing and drying machinery for phosphate and lime rock, suction and dipper dredges.

We contract for complete plants.

Electric Motors



Large Stock of New and Used

Motors and Generators

Repairs for Any Make or Type

Sorgel Electric Co., Milwaukee, Wis.

MITCHELL ELECTRIC VIBRATING SCREEN

Less than 3/8 H.P. is required to operate a Mitchell screen, yet it is continually establishing records for large tonnage handled and thoroughness of screening. One Mitchell screen operating uninterruptedly over a period of 18 months handled more than a million tons of material at a cost, including power, labor and screen cloth expense, of less than one-tenth of a cent per ton.

Write us for full details of Mitchell success.

STIMPSON EQUIPMENT CO.
Felt Bldg. Salt Lake City—Grand Central Terminal Bldg. New York

SCREENS
Of All Kinds

Chicago Perforating Co.
2445 West 24th Place
Tel. Canal 1459 CHICAGO, ILL.

BYERS
Full Circle
CRANE

Mounted on road wheels, crawling traction trucks ("caterpillars") under one or both ends, or rail trucks, any gauge. Splendidly designed; generously good materials; standard Byers workmanship.

Get particulars *today*.

THE BYERS MACHINE CO.
310 Sycamore Street
RAVENNA, OHIO
Agents in Leading Cities

THE STANDARD OF EXCELLENCE

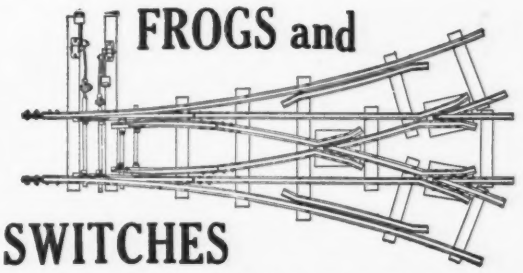
BALDWIN
Industrial and Contractors' LOCOMOTIVES

are in use where dependable motive power is required.

Full information upon request

The Baldwin Locomotive Works
PHILADELPHIA

BUILDERS OF THE "ARNOLD" LIME KILN AND LINING
ARNOLD & WEIGEL
CONTRACTORS AND ENGINEERS
WOODVILLE, OHIO
Specializing in
THE DESIGN OF MODERN LIME CALCINING AND HYDRATING PLANTS.

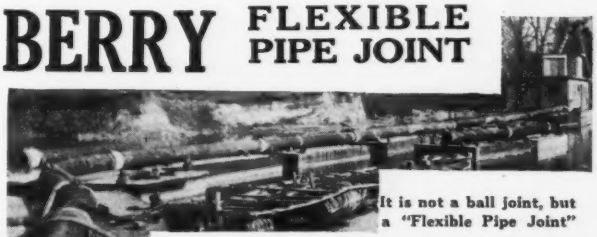


FROGS and SWITCHES

The Central Frog & Switch Co., Cincinnati, O.

Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fishplates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.

BERRY FLEXIBLE PIPE JOINT



It is not a ball joint, but a "Flexible Pipe Joint"

For Sand and Gravel Hydraulic and Pontoon Lines

Get rid of pipe line troubles. Berry Flexible Joints are made of cast steel and will outwear enough rubber sleeves to save 100% in two years. They connect and disconnect instantly. Patent Locking Device enables one man to lock the two pipes together in a few seconds. Widely used.

Made with Flanged Ends or Riveted to Pipe

BERRY FLEXIBLE PIPE JOINT CO., Inc.
1604 Ludlow St., Philadelphia, Pa.

WHY? — WOOD DRILLS

Because They— { Drill faster / Stand more abuse / Need less repairs / Thrive on hard work }

Men who know, prefer "WOOD DRILLS" Because they fill the bill and cut the cost.

Wood Drill Works
30-36 Dale Ave. Paterson, N. J.

TERRY

FAMOUS DERRICK IRONS, FITTINGS AND ERECTORS' TOOLS

FULL CIRCLE CRANES. "EQUIPMENT THAT LASTS." TIMBER & STEEL DERRICKS

LET US SOLVE YOUR MATERIAL HANDLING PROBLEMS.

All Types of
Steel and Timber DERRICKS **TERRY**

Pierce Arrow

The most powerful truck built

THEY'RE SELF-PROPELLED

MYERS WHALEY SHOVELS

There's no need of pushing or pulling a Myers-Whaley Shovel around. It is self-propelled, adaptable to any gauge track, and loads at the rate of one ton a minute.

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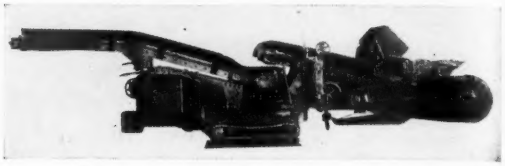

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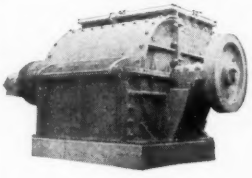
combine dollar-saving features of bucket construction which are illustrated in our latest catalogue.

Write for it today.

THE OWEN BUCKET CO.
538 Rockefeller Bldg., Cleveland, Ohio



Gruendler Hercules Crushers

Gruendler Hercules Crushers are reducing production costs in hundreds of plants throughout the country.

"America's Famous Crushers"

For Crushing and Pulverizing Limestone, Lime, Gypsum, Shale, etc., a Gruendler cannot be beat.

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Gruendler Patent Crusher & Pulverizer Company
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SAUERMAN DRAGLINE CABLEWAY EXCAVATORS

dig, convey, elevate and dump in one operation

Cost data furnished by prominent gravel producers who are using Sauerman equipment backs up our claim that sand and gravel can be excavated and conveyed from pit to plant by one of our drag-line cableway excavators at a lower cost per ton than by using any other equipment or combination of equipment.

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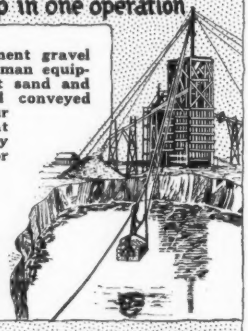
Sauerman Bros.
1140 Monadnock Bldg.
Chicago
Also Mfrs. of Power Scrapers



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Insure Fullest Satisfaction

Crushing Rolls.
Pulverizer Mills.
Direct and Indirect Fired Dryers.
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Fuller-Kinyon System for Conveying Pulverized Materials.
Sprockets, Traction Wheels, and Roll Heads.
All kinds of High Grade Chilled Charcoal Iron Castings for All Uses.

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Fullerton, Pa., U. S. A.

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OHIO LOCOMOTIVE CRANE CO.
POPLAR ST. BUCYRUS, OHIO

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Ruggedly constructed cars of all types, and complete narrow-gauge railway equipment. May we mail you present and subsequent issues of "Quarry Car Practice"—a series of bulletins containing a costly collection of hundreds of photographs of quarries, car equipment and quarry haulage methods, showing car types that have made good and those that have failed.

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Fabricators and Erectors of Steel Storage Tanks
Any Capacity for All Purposes

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Most Modern Fabricating Shop in America

"Hercules Solid Weld" Steam Shovel Chains

Best In the World. Will Actually Wear Out

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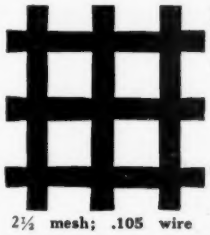
W. Toepfer & Sons Co.
Milwaukee **Wisconsin**

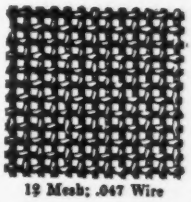
"CLEVELAND" DOUBLE CRIMPED WIRE CLOTH



2½ mesh; .105 wire

A uniform fineness is assured by the use of "Cleveland" Double Crimped Wire Cloth, making it unequalled for the screening of Sand, Gravel, Crushed Stone and Cement. "Service" is the definite policy of this organization, and through every phase of manufacture this end is constantly before us.

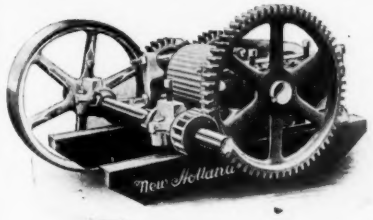
A large stock always on hand. However, any special mesh will be manufactured to suit requirements. PRICES RIGHT



1¢ Mesh; .047 Wire

THE CLEVELAND WIRE CLOTH AND MANUFACTURING COMPANY
3573 East 78th Street **Cleveland, Ohio**

New Holland Re-crushing Rolls



From 1 to 10 ton capacity. Especially designed for fine concrete work and sand. Low in price. Satisfaction guaranteed. Write for catalog on Rolls, Rock Crushers, Revolving Screens and Elevators.

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For Every Purpose

H. K. PORTER COMPANY
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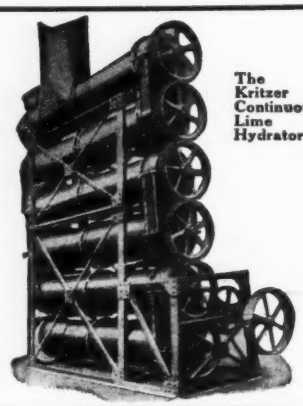

The Kritzer Continuous Lime Hydrator

HYDRATE

Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

THE KRITZER COMPANY

503 South Jefferson Street **CHICAGO, ILL.**

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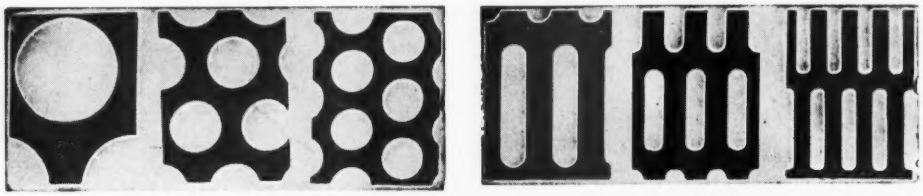
All sizes and shapes of Holes



All kinds and thicknesses of Metal

For Screening Stone, Gravel, Sand, Cement and all Minerals

THE HARRINGTON & KING PERFORATING COMPANY

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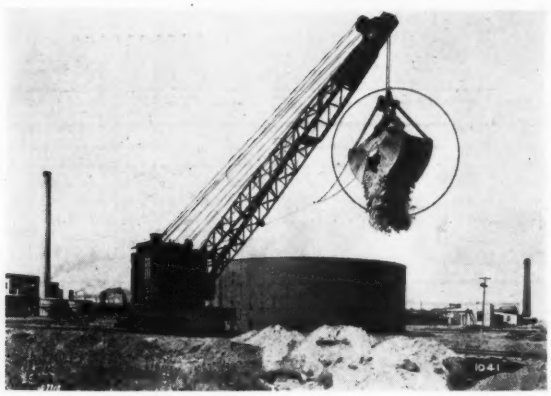
LOCOMOTIVE CRANES
CLAM SHELL BUCKETS - SHIPBUILDING CRANES
CAR DUMPERS PILE DRIVERS
THE McMYLER INTERSTATE CO.
CLEVELAND OHIO



Clam Shell Buckets at Bargain Prices

We are offering a limited number of "Type 'R' Clam Shell Buckets" in 1½ and 2 cu. yd. sizes for immediate shipment at the exceptionally low prices of—

$725.00 F. O. B. Bedford, for the 1½ cu. yd. Bucket, weighing 4250 pounds and

$850.00 F. O. B. Bedford, for the 2 cu. yd. Bucket, weighing 4975 pounds.

These buckets are of the flat link power wheel type and are of heavy substantial construction.

This type of bucket is especially adapted to the handling of coal, limestone, sand, gravel and other similar materials.

If you wish to purchase a superior bucket at the above prices you must act quickly.

THE McMYLER INTERSTATE CO., Cleveland, Ohio

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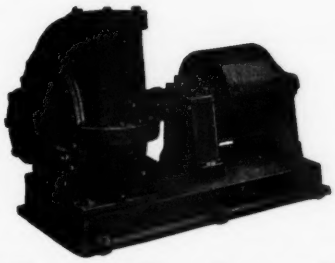


Solid Lined Dredging Pump

Although originally designed as a mining pump, this type is a splendid dredging pump.

The lining is made of manganese steel or hard iron as is also the piston.

Built in sizes 2″ to 12″ inclusive.

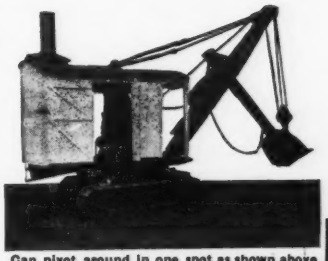
Morris Machine Works
Baldwinsville, N. Y.

39 Cortlandt Street, New York City
Real Estate Trust Bldg., Philadelphia, Pa.
217 N. Jefferson St., Chicago, Ill.

Bulletin No. 19-B fully describes our complete line of sand and dredging pumps. Have you your copy?

Morris

Since the Civil War Builders of Centrifugal Pumps, Hydraulic Dredges, and Steam Engines



Can pivot around in one spot as shown above

Perfect Power Steering from the Cab

The caterpillar type ERIE steers perfectly, by power, from the cab — making either sharp or gradual turns as desired. No man is needed to walk alongside and throw clutches to steer.

The elimination of this clutch-throwing job cuts one needless man off the payroll. This is just one of the many ways in which the caterpillar type ERIE saves you money.

For working over soft ground, a caterpillar type ERIE means the saving of thousands of dollars to you. We would like to tell you about its many advantages in detail—and send photos. Write for Bulletin P-60.

BALL ENGINE CO., Erie, Pa., U. S. A.
Builders of ERIE Steam Shovels and Locomotive Cranes

And in many other ways the caterpillar type ERIE is far superior

FULLY LUBRICATED: Treads, links and rollers are automatically lubricated by internal reservoirs.

ALL STEEL TREADS that are almost indestructible.

CLIMBS GRADES as steep as 30%, and travels several times as fast as is possible without lubrication.

EASILY INTERCHANGEABLE with traction wheel mounting on the same truck frame.

IN EVERY WAY, fully up to the standard of the ERIE Shovel.

ERIE Revolving Shovels

BALL Engine Co.

STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY

Crushing, Grinding, Pulverizing,
Screening, Sizing, Air Separating, Mixing,
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Complete Units -:- -:- Engineering Service

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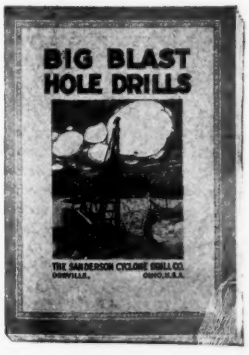


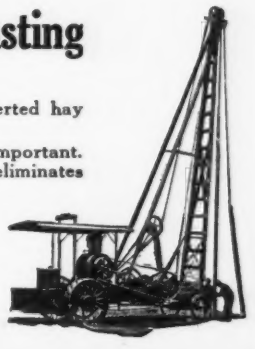
Analyze Your Drilling and Blasting

Our new Blast Hole Catalog B-46 (96 pages) will help you.

The day of poking a hole down with a rivet header or a converted hay bailer is past.

Drilling, being the first step in stone production, is the most important. One cent or one-half cent per ton cost saved in this operation often eliminates competition.

With Cyclone No. 14 Drills on the job and Cyclone Service in reserve, your drilling and blasting troubles fade—and your costs will be right.



THE SANDERSON-CYCLONE DRILL CO.
Orrville, Ohio
Eastern and Export Office, 30 Church St., New York

INTERNATIONAL BARRELS

are without equal for quality, strength and durability

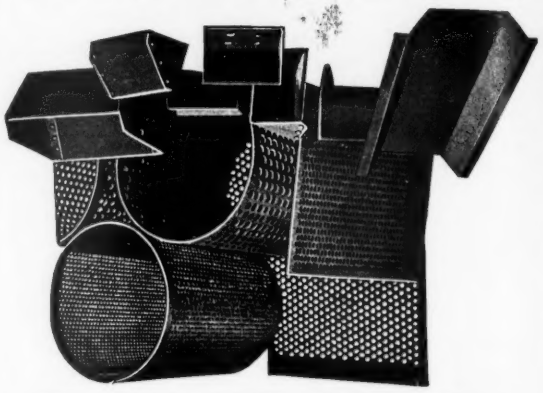
They are the best containers used in the Lime, Cement and Plaster Trades.

Our several branch shops permit quick deliveries of these QUALITY BARRELS to your plant, wherever it is located.

Samples and prices sent on request

International Cooperage Co., Inc.
Niagara Falls, N. Y.

Perforated Metal Screens
FOR
Stone, Gravel, Sand, Etc.



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General Sheet and Light Structural Work

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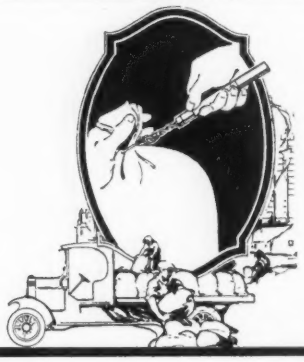


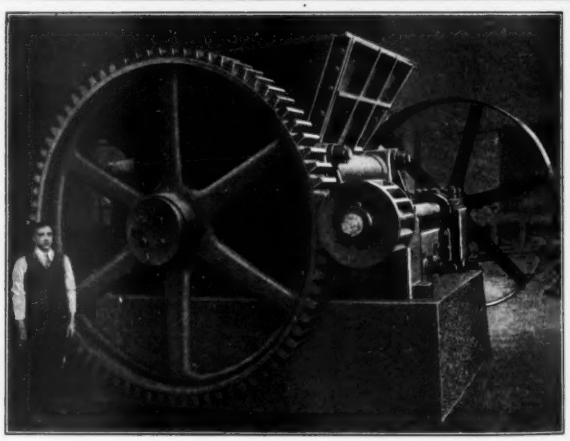
Bates Wire Ties Now Sell at Less Than Pre-War Basis

Write for the new prices on Bates Wire Ties—they cost you less than string—actually priced lower than during the pre-war period.
If you are using the Bates System of Tying, stock up at the new prices.
If you haven't adopted the Bates System yet—

Send for this FREE Trial Bag Tying Outfit

The Bates FREE Trial Bag Tying Outfit, containing one Bates Spring Return Tying Tool and 20 each of 4, 4½, 5, 5½ and 6 inch Bates Wire Ties, will be sent you on receipt of your signed agreement to try this Bag Tying Outfit on your work, and then within 15 days, send $2.50 for the outfit or return the tool to us.
These trial ties cost you NOTHING.

BATES VALVE BAG COMPANY
7326 South Chicago Ave. Chicago, Ill.
110 Great Portland St. London, W. I., England



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After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

McLanahan-Stone Machine Co.
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Screens, Elevators, Conveyors, Rock Washers, Etc.

GEAR AND FRICTION DRIVEN GASOLINE LOCOMOTIVES—2½ TO 25 TONS ON DRIVE WHEEL

WHITCOMB LOCOMOTIVES

IT WILL PAY YOU TO GET OUR PROPOSITION BEFORE YOU BUY

GEO. D. WHITCOMB CO.

MAIN OFFICE AND WORKS

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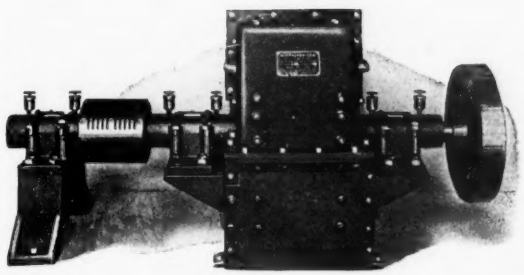
STORAGE BATTERY LOCOMOTIVES—1 TO 8 TONS ON DRIVE WHEELS



By the very nature of the work it is called upon to perform a pulverizer must be much stronger than the material it handles.

Only STEEL will stand the stress

"K-B" is built ALL-Steel

Catalog with full particulars on request

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K-B PULVERIZER

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METRO NITE

for Stucco-

Stucco Buildings, Concrete Blocks or Bricks faced with Metro-Nite are beautiful, artistic and everlasting.

Metro-Nite White is of a crystalline character, really a siliceous dolomite. It is extremely hard, sharp and cleanly graded, making a bright, sparkling face.

Free samples mailed on request.

Two colors—White and Green.

The Metro-Nite Co.
333 Hartford Ave., Milwaukee, Wis.

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PERFORATED STEEL SCREENS

The success of any house supplying repair and renewal parts depends on furnishing what is needed quickly and correctly, and of satisfactory quality.

Sixteen years in the Perforated Metal field have given us the experience, equipment and technical knowledge, and three hundred tons or more of Steel Plates and Sheets enable us to fill rush orders promptly.

Try us with your next order.

Cross Engineering Company, Offices and Works, Carbondale, Pennsylvania

Among the Precious Stones—

GREENSTONE

Is the one lasting ornament for surfacing Stucco. The natural olive-green color blends in harmony with Nature's color scheme, and age only tends to deepen the shade. The pure white back-ground of stucco, dashed with our No. 48 product, gives you a finish of unequalled beauty and durability.

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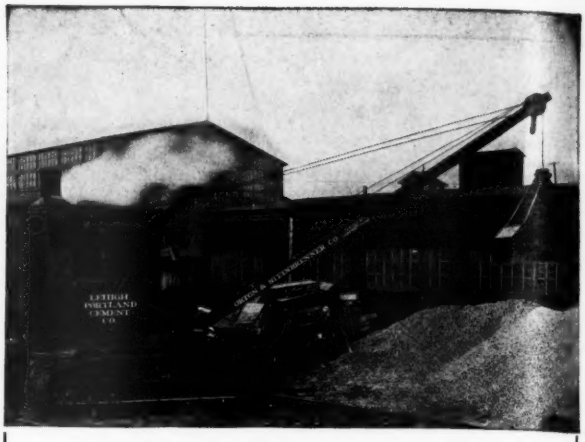
Mills: Deerfield, Md. **Roanoke, Virginia**



Economy, speed and lowest cost of operation are assured with

O. S. DEPENDABLE
Locomotive Cranes

Manufactured in sizes ranging from 7 to 60 tons capacity. 7- and 12-ton sizes mounted upon either railroad wheels, crawling treads or traction wheels and equipped to handle clam shell, orange peel or scraper type bucket, and electro magnet.
Equipped for operation either by steam, electric or gasoline engine as desired.
The ideal equipment for contractors and supply yards.
Catalog No. 18 sent upon request.

Orton & Steinbrenner Co.
Main Office—Chicago, Ill.
Factory—Huntington, Ind.

The Clyde Lime Hydrator Performance Counts

The Clyde was first in the field, and through dependable and economical performance is still first choice of lime operators.

The Clyde Hydrator produces big capacities of lime at only three-fifths the cost of any other hydrator on the market.

The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.

Simple, easiest to operate and most economical in cost of installing, maintaining, and operating.

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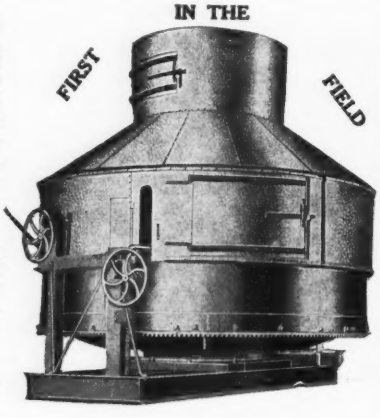

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DULUTH - - MINNESOTA

Universal Crushers

The biggest value for your money. Universal crushers and pulverizers reduce stone to desired size or fineness in a jiffy! Fifteen years of designing and building experience have made possible the exceptional ability of Universals.

Universal Crusher Co.
225 Third Street
Cedar Rapids, Iowa, U.S.A.

Ask for Folder 1918

In Buying Blast Hole Drills

DON'T buy the kind of machine that others have used and discarded!

DON'T buy a machine that the greatest Quarry Engineers of the country have condemned after severe scientific tests.

BUT—buy the Drill that takes the first place under all conditions!

☛ **BUY the "CLIPPER"! The most satisfactory Blast Hole Drill in the world!**

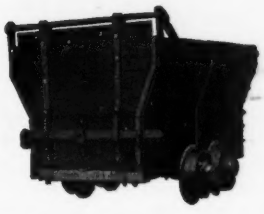
Visit the "Big" Quarries in the eastern half of the United States and **see what they use!**

Then write to us or come and see us and get information that will put you on the right track. Many big quarries are saving thousands of dollars annually because they took and are taking our advice about Blast Hole Drilling matters!

☛ **If you make a mistake** you have **nobody to blame but yourself.**

The Loomis Machine Company, Tiffin, Ohio

WATT CARS



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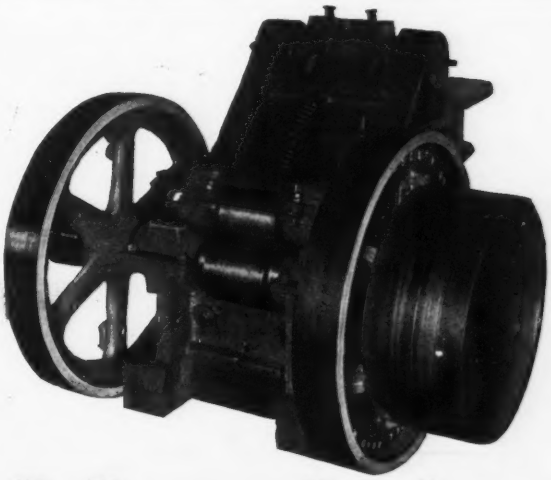


Reliance Crushers

IN ALL SIZES FOR EITHER PORTABLE PLANTS FOR ROAD BUILDING OR STATIONARY QUARRY INSTALLATIONS.

BUILT FOR LONG, HARD SERVICE—WILL SAVE YOU MONEY IN THE LONG RUN

Let us quote you prices

Universal Road Machinery Co., Kingston, N. Y.

Branches in all principal cities in U. S. and Canada
MANUFACTURERS OF THE FAMOUS RELIANCE LINE OF ROAD BUILDING AND QUARRY EQUIPMENT

DORR

Better Mixed Slurry at Lower Cost

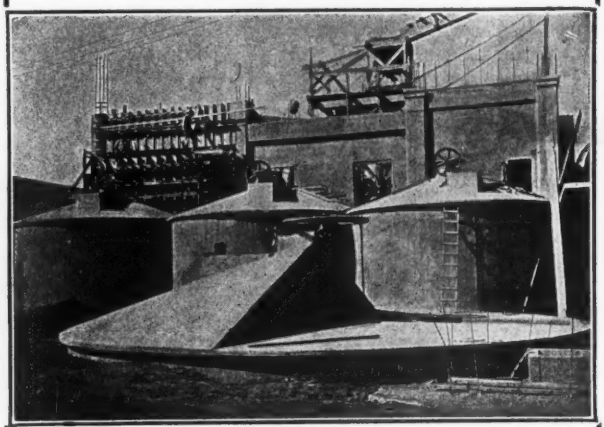
You can save in first cost, power cost, time required for mixing, and repair costs.

And you can get a more uniformly mixed slurry at the same time.

The Dorr Slurry Mixer

is securing these results in actual operation, day after day, at many wet-grinding cement mills.

Let us send you Bulletin No. 22 with actual operating figures.



The Dorr Company
ENGINEERS

101 Park Avenue

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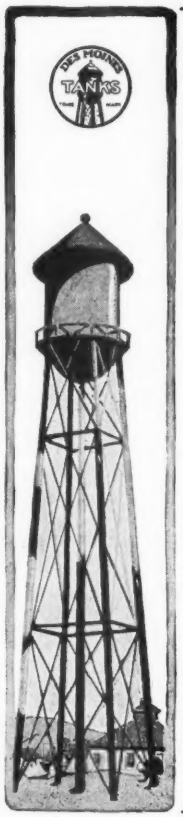
Research Tests Design Equipment



DES MOINES

The Sentinel on the Tower

For more than a quarter of a century DES MOINES water tanks have stood, like a sentinel on a tower, to protect from that subtle enemy—fire, and to provide an adequate water distribution wherever required for immediate needs.

DES MOINES water tanks are designed by our own engineers, fabricated in our three modern plants, erected under our own supervision, and delivered complete in every detail according to approved specifications.

Consult our corps of engineers, whose wide experience and special knowledge of this class of work is at your service, without any obligation whatever on your part.

Write to our nearest district office and ask for Catalogue No. 46

Pittsburgh-Des Moines Steel Company

846 Curry Bldg., Pittsburgh, Pa.

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BUCHANAN JAW CRUSHERS
ALL STEEL PATENTED

Buchanan Type "B" All Steel Jaw Crusher, Sizes 4x12" to 18x36"—Bulletin No. 9

Years of manufacturing experience, combined with an intimate knowledge of the conditions under which such machines operate, assures the purchaser of Buchanan Equipment machines of remarkable durability.

Crushing Plants Complete

C. G. BUCHANAN CO., Inc.

Cedar and West Streets New York City

Wherever materials are reduced to a powder in the dry state, there you will find Raymond Mills giving continuous day in and day out service.

Whether it is the pulverizing of Coal for fuel; Barytes, Lithopone and similar products for paint and rubber manufacture; Chemicals, Dry Colors or Dyestuffs in the chemical industries; and many others, too numerous to mention, there is a Raymond System which will fill the requirements to the last specification.

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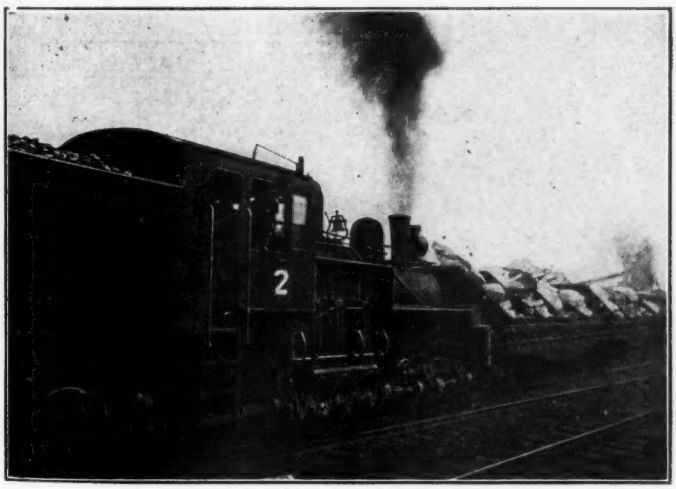
LIMA LOCOMOTIVES



Getting out rock with a Shay

With Shay Geared Locomotives you can get rock out of almost inaccessible places.

A flexible driving shaft which compensates for sharp curves, small gear-driven wheels—even those of the tender being connected to the driving shaft, and a powerful grade-climbing engine, make hard-to-get-at spots easy for a Shay.

You can operate a Shay where you couldn't use a rod engine.

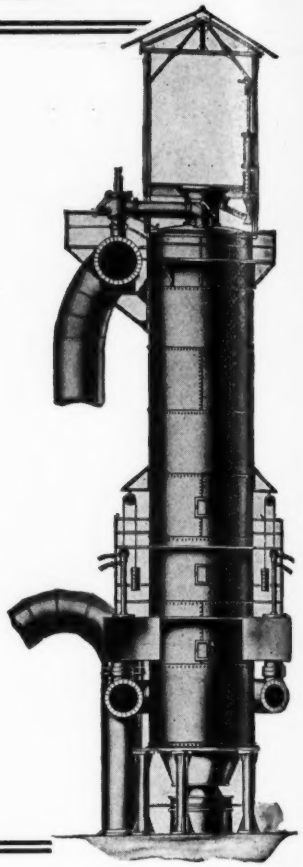
Greater production and lower cost operation with Shay Geared Locomotives. Ask Lima engineers.

LIMA LOCOMOTIVE WORKS, Inc.
Lima, Ohio **17 East 42nd Street, New York**

Continuous Discharge—Gas Fired
LIME KILNS

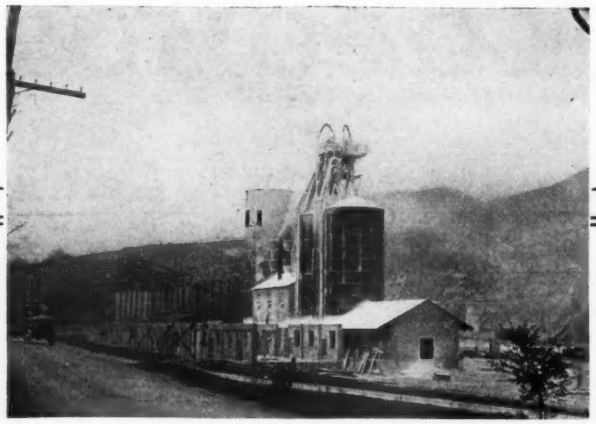
The wastefulness or efficiency of any lime burning apparatus is determined by the amount of fuel per ton of lime produced.

Our Kilns are not an experiment, but have successfully met the test of years of actual service. The design is the work of our Consulting Mechanical and Chemical Engineer, who has had many years of practical operative experience. They embody a number of labor saving devices, and are designed to secure maximum production with minimum fuel consumption; their record in this respect should interest every lime producer in the country.



Glamorgan Pipe & Foundry Company
Lynchburg, Va., U. S. A.

Using the Nationally Famous Virginia Foundry Irons



Schaffer Lime Plants can be built in small units embodying all the essential economical features of our large plants. Owing to freight conditions and the necessity for localizing certain operations, the

Schaffer Engineering & Equipment Co.

are in a position to offer a real service in connection with the design and installation of lime plants of either large or small capacity. The matter of economy in operation, whether in large or small units, will be paramount for the next several years. Also the necessity of quality as evidenced by Schaffer Engineering and Equipment Company plants is equally important.

Schaffer Engineering & Equipment Co.

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PRODUCTS

Heavy Gearing and Friction Clutches for paper-mills, rubber-mills, tube-mills, cement-mills, rolling-mills, stone quarries, and rock products, mining and coal-handling machinery, elevators and malt houses, turbines and water wheels, sugar refineries, packing houses, electric light plants, powder-mills, glass factories; cut gears and machine molded gears of all kinds.

Shafting, pulleys, hangers, couplings, collars, pillow blocks, worm-wheels, fly-wheels, and rope sheaves.

Makers of grey iron, and semisteel castings by analysis.

Special machinery built to order on modern tools at usual shop rates.

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Established 1859 — Incorporated 1877

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USE

Cordeau-Bickford Detonating Fuse

For well drill blasting and the tunnel and pocket method of blasting, where large quantities of explosive are to be detonated, use safe, efficient Cordeau-Bickford and get lower blasting costs.

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Established 1836 **Original Makers of Safety Fuse**

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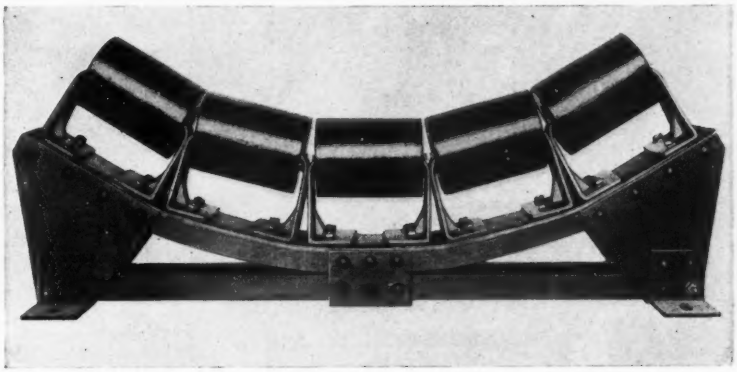
(Continued on page 60)

for extreme duty the Triple-X Carrier

Save:
Power
Belt Wear
Lubrication

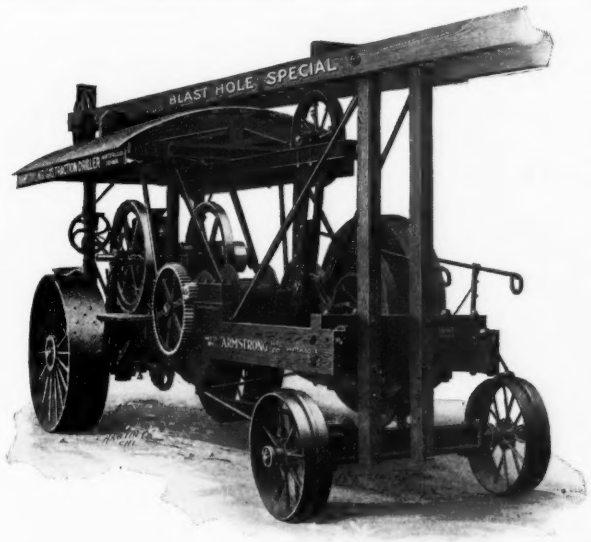


S-A Unit Ball Bearing Carriers are Patented

RECOGNIZING the demand for a belt conveyor carrier of exceptional strength, S-A engineers developed the new Triple-X type. It is a carrier built entirely of steel and of massive construction, maintaining the same features and all the refinements of the popular S-A Unit Ball Bearing Conveyor Carrier.

Write for Information and Price

STEPHENS-ADAMSON MFG. CO., Aurora, Illinois



The Armstrong is made in both Portable and Tractor types. It is simple, strong, durable. It lives up to the trade mark it bears:

Armstrong
BLAST HOLE DRILLS
BUILT FOR SERVICE SINCE 1867

It Is Performance That Counts

Quarry profits depend largely upon efficient work on the ledge. We could talk to you until dooms-day about the efficiency and simplicity of the Armstrong Blast Hole Drill and not exhaust the subject. But just now we'll let quarrymen do the talking.

Three 27-ft. Holes Per Day

"We have been using one of your Special Blast Hole Drills for two years in a 27-foot ledge of hard limestone and can easily complete three holes per day."
Hugh Murphy Construction Company.

440% Increase in Footage Drilled

"We have had one of your Special Blast Hole Drills in constant operation for the past three years and are well pleased. It is easily handled and readily moved from hole to hole. Our footage drilled per day was increased nearly 440% when we installed this outfit, replacing an older type of another make."
Mississippi Valley Iron Company.

Those are only two out of thousands of such letters that we have on file. If our Special Blast Hole Drill will do such work as that for others, it will do it for you.

The Armstrong, you know, holds the world's record of 386 ft. of 6-inch hole in solid rock in ten hours.

Get in line for more efficient work—for greater profits. Write us today for our catalog B-1.

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Cleveland, Ohio.

SATISFIED

FEDERAL STONE COMPANY
MANUFACTURERS AND DEALERS IN
CRUSHED STONE
18 CHAMBER OF COMMERCE BLDG

CHICAGO, ILL.

June 27 1921.

Allis-Chalmers Manufacturing Company
Peoples Gas Bldg.
Chicago Ill

Gentlemen:

Referring to the new installation in our crushing plant at LaGrange, Illinois, the plant has now been in operation for about two months and we can say that it works entirely satisfactorily in every detail

We are very much pleased with the operation of the No 18 "H" new improved crusher. One feature of your new machine that appeals to us very much is the simplicity and accessibility of the oiling system. We experienced a little difficulty with the system when the machine was first started, but this was quickly remedied, and we appreciate the prompt cooperation of your engineers in eliminating this trouble.

As to the capacity of the machine, we cannot definitely state, as we are hoisting on one side only, but we have timed the machine on a single carload and five yards will pass through in about one minute which would indicate that the crusher will handle three hundred yards or better per hour. This is not a fair estimate, as the crusher bowl is only full two-thirds of the way around, due to the fact that we are dumping on one side only. (The machine is set for 4" opening on the open side).

We will also state that the electric hoist you sold us with this equipment is more than meeting the duty outlined in your specification. This hoist was designed to hoist in balance having two inclines, one on each side of the crusher, but due to the quarry conditions, we are hoisting on one side only, which means that the motor must handle an additional load of 10,000 pounds, which is the weight of the car. We are able to stop, hold and start the full load on any part of the incline.

With respect to the general design of the new addition to our plant, we have never seen a better balanced and smoother working installation, and we wish to express our appreciation of the way your company had handled the proposition throughout

Yours very truly

FEDERAL STONE COMPANY
Samuel Foley
President.

ALLIS-CHALMERS
MANUFACTURING COMPANY

ELECTRICAL MACHINERY
STEAM TURBINES — STEAM ENGINES
HYDRAULIC TURBINES
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MILWAUKEE, WISCONSIN. U.S.A.

A radical departure in Screens

The Simplex Screen

Gravitation Principle—Wullstein Patents

No Cross Wires
No Openings with Closed Ends
Constantly Increasing Space Between All Teeth

Resulting in

AN ABSOLUTELY NON-CLOGGING SCREEN

No Power
No Labor
Huge Capacities
Efficient Screening
Long Life
Sectional Construction
Permitting Renewal of Desired Part Without Disturbing Other Parts

Simplex Screens now in successful operation handling many different materials.

Outline your requirements to us. Ask for Bulletin 10-B.

SIMPLEX SCREEN CO.

Felt Building Salt Lake City, Utah

Buyers' Bulletin

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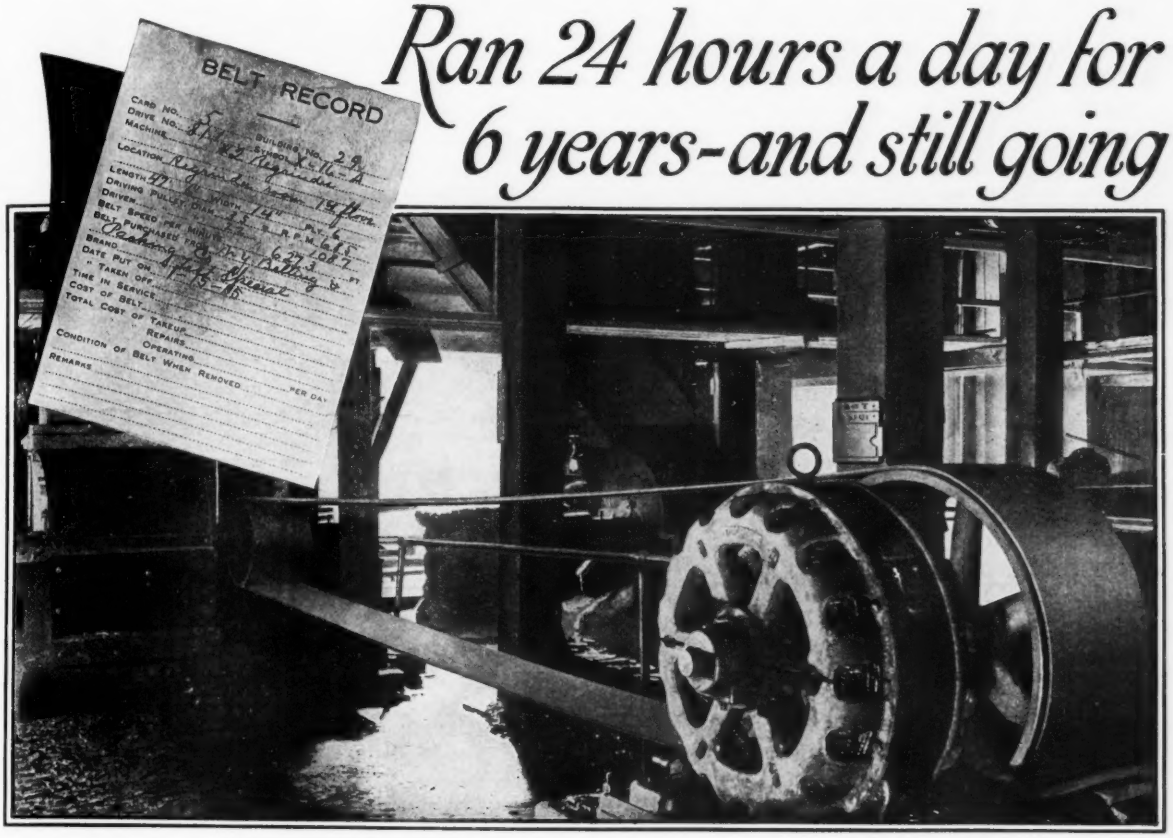

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